ORDER NO. MTNC010417C1
B2

Service Manual

HDTV MONITOR

Main Manual
(P5P)

Panasonic

Models	Chassis
PT-51HX41E	**AP820**
PT-51HX41CE	**AP820**
PT-56HX41E	**AP820**
PT-56HX41CE	**AP820**
PT-61HX41E	**AP820**
PT-61HX41CE	**AP820**

This Service manual is issued as a service guide for the models of the **P5P** family listed above. Included in this manual are a set of schematics, alignment procedures, disassembly procedures and a complete parts list.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in the Main Manual.

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Important Safety Notice

Special components are used in this projection television which are important for safety. These components are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent x-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An ***isolation transformer*** should always be used during the servicing of a PTV whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the PTV from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always replace protective devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the PTV. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials, as high as 32.5kV, are present when this PTV is operating. Operation of the PTV without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **handling the *picture tube***. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs. per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. DAG ground lead) to the anode with a well insulated wire or use a grounding probe.

X-ray Precautions

The front area (between the projection tube and the lens) is enclosed by a metal box to ensure positive safety during normal and abnormal conditions when checking and repairing. To fully ensure safety, the following precautions must be observed.

1. Do not remove the lens or metal box.
2. Make sure to turn the power OFF when the lens is removed or when checking the cleanliness of the lens.
3. Do not remove the lens or metal box to check the projection tube for operation by watching it directly. Use a mirror or paper to view the image.

Before returning a serviced PTV to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs. Press the POWER switch ON.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screw heads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (See Figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between and exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other expose metallic parts.

Verify any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the PTV must be repaired and rechecked before it is returned to the customer.

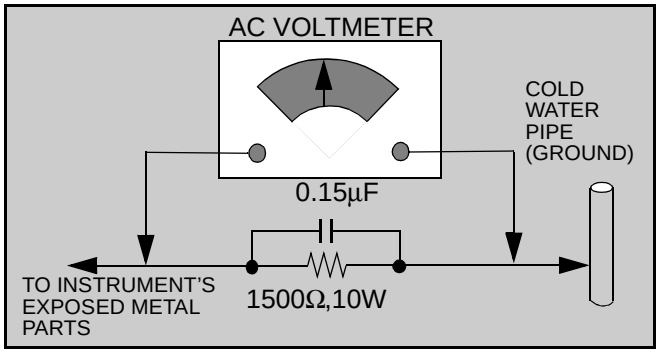


Figure 1. **Hot Check Circuit**

Insulation Test

Connect an insulation tester between an exposed metallic part and AC line.

Apply 1080VAC/60Hz for 1 second. Confirm that the current measurement is 0.5mA ~ 2.0mA. Repeat test with other metallic exposed parts.

X-ray Radiation ⚠

WARNING: The potential source of X-ray radiation in the PTV is in the high voltage section and the picture tube.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high should be **31.5kV ± 1.0kV**. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Important Safety Tests

Measuring H.V. ⚠

The anode caps are cemented to the CRTs. To gain access for high voltage measurement, remove the red CRT's anode lead from the flyback transformer distributor. Grasp the anode lead protective cap at its bottom and squeeze it against the locking cap body inside, Rotate 1/4 turn counter clockwise and pull the anode lead sleeve out of the FBT distributor. Connect a high voltage lead (+) from your H.V. meter to the FBT distributor, and the common (-) to cold ground (⏚). (See Figure 2).

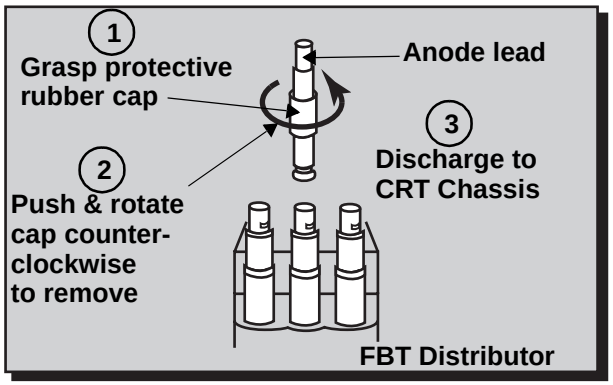


Figure 2. **Removal of FBT leads**

Note: *Reinsert the anode lead into the FBT distributor until it is tightly and fully seated. Turn the locking cap clockwise to lock in place.*

(EHT) Protector Operation Check

With the cabinet back removed, apply a nominal 120V AC to the PTV.

Over Voltage Test

Preparation:

1. Turn PTV "OFF"
2. Connect an NTSC signal generator to the antenna terminal.
3. Connect DVM (+) TPD50 and (-) TPD51 on D Board. (See Figure 4)

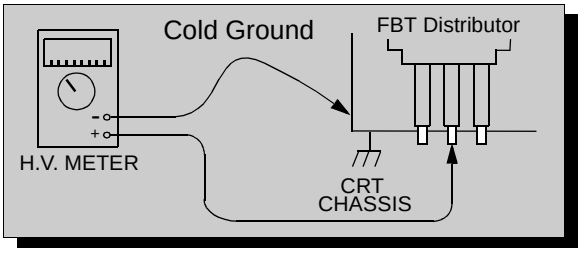


Figure 3. **Measuring H.V.**

4. Connect a H.V. meter (static type, class 0.1) with high voltage leads to high voltage distributor on FBT. (See Figure 4)

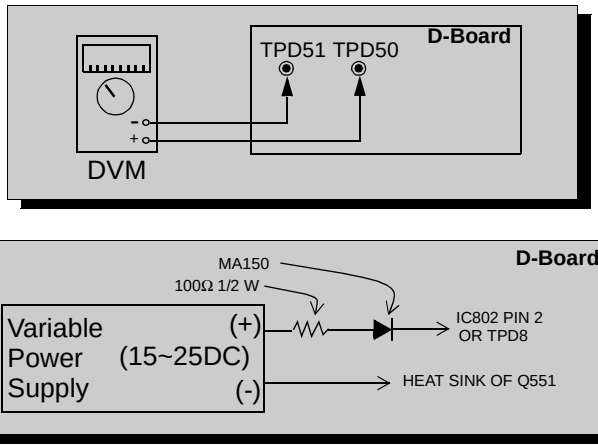


Figure 4. **DVM & Power supply connection.**

5. Connect the 15 ~ 25 V DC variable power supply to (+) TPD8 or IC802 pin 2 (D-Board) and (-) heat sink of Q551 (See Figure 4).

Procedures:

1. Apply a monoscope pattern.
2. Turn PTV ON.
3. Adjust the Picture or Brightness controls so that the DVM reads 16.5 volts ± 0.5 volts.
4. Increase the variable power supply until set turns off. The set should turn off at 16.5 volts ± 0.5 volts (DVM) and high voltage less than 36.4kV.
5. If the DVM reading is other than 16.5 volts (± 0.5 volts), readjust picture or brightness control and repeat steps 3.
6. Turn off the variable supply and confirm that the set will turn on with the Remote Control.

Table of Contents

Important Safety Notice 2

Safety Precautions 2

General Guidelines 2
X-ray Precautions 2
Leakage Current Cold Check 2
Leakage Current Hot Check 2
Insulation Test 2
X-ray Radiation 2

Important Safety Tests 3

Measuring H.V. 3
(EHT) Protector Operation Check 3

Service Notes 5

Leadless Chip Component (surface mount) 5
Component Removal 5
Chip Component Installation 5
How to Replace Flat-IC 5

SPECIFICATIONS

Feature Table 6
Boards Designation 7
PTV - Location of Controls 8

Quick Reference Control Operation 8

Remote - Location of Controls 9

SERVICE

Chassis & Boards Layout 10

Board Description 10

Disassembly for Service 11

Speaker Grill Removal 11
Keyboard Removal 11
Speakers Replacement 11
Cabinet Back Lower Removal 11
Cabinet Back Cover Removal 11
Cabinet Front Removal 12
Screen Assembly 12
Main Chassis Block 12
Disassembly for CRT Replacement . . . 13
X-RAYS SHIELD 13
CRT Replacement 13
Optical Block Position Adjustment 14
PTV Screen Assemblies 15
B+ Voltages Table 15

CRT Set Up 16

Dynamic Focus Adjustments 16
Electrical Adjustment 16
Focus - Optical Lens Adjustment 17
Optical Adjustments 17
Electric & VM Focus Adjustment, Complete adjustment 17
Vertical Size Adjustment (VSIZE) 18
Horizontal Phase Adjustment (H-POS) . 18
Trapezoid Adjustment (EWTRA) 18
Pincushion Adjustment (PCC) 19
Centering Magnets Adjustment 19
Horizontal Size Adjustment (H WID) . . . 19
Convergence Adjustment 19
Coarse Adjustment Mode (COARSE) . . 20
Fine Adjustment Mode (FINE) 22
Horizontal and Vertical Size Check 24
Convergence Alignment Template 24

Serviceman Mode (Electronic Controls) 25

Quick Entry to Serviceman Mode: 25
To toggle between Aging and Serviceman modes 25
Exiting the Serviceman Mode: 25
To Check Purity: 25
Instructional Flow Chart for Serviceman Mode 28
HV_Feedback Voltage 30
Bright Adjustment (BRIGHT) 30
Sub-Contrast (CONT), Sub-Bright (FINAL) Adjustment 30
Tint Adjustment (TINT) 30
Red, Green & Blue Screen Cutoff 31
White Balance Adjustment 31
Tint and Color Check 31
MTS Circuit Adjustments 31
Input Level Adjustment (MTSIN) 31
Stereo Separation Adjustment (SEPAL & SEPAH) 31
Clock Adjustment (CLOCK) 32

Audio Signal Path Block Diagram 33
Video-Chroma Signal Path Block Diagram . . 34
IIC Connection 35
Description of Connectors 36
Parts List 38

FOLDOUTS

D-Board layout 49
D-Board schematic (left portion) 50
D-Board schematic (right portion) 51
A-Board schematic (left portion) 52
A-Board schematic (left middle) 53
A-Board schematic (right middle) 54
A-Board schematic (right portion) 55
DH-Board schematic 56
K, G & R-Board schematics & layouts 57
LR-Board schematic, layout & voltages 58
LB-Board schematic, layout & voltages 59
LG-Board schematic, layout & voltages 60
A & D-Board voltages 61
Waveforms 62

Service Notes

Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color on the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicated the type and the second letter, the grade of transistor.

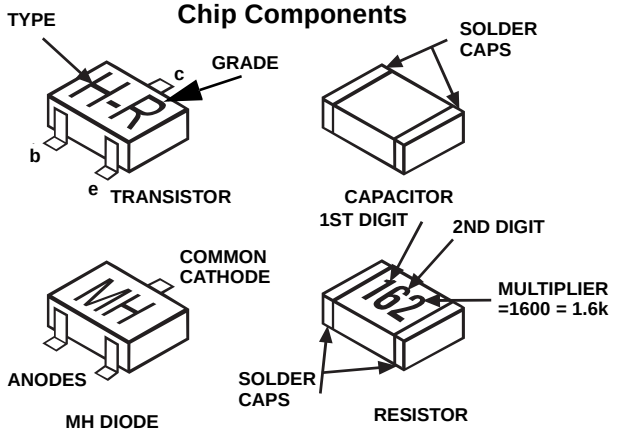
Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watts iron until solder flows. Do not apply heat for more than 3 seconds.

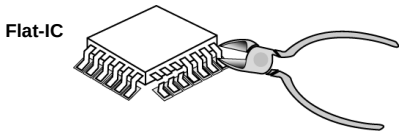


How to Replace Flat-IC

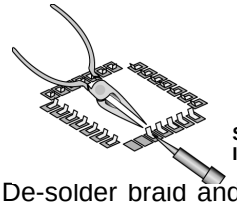
- Required Tools -

- Soldering iron
- De-solder braids
- Sharp pliers (wire cutters and long nose)
- Magnifier

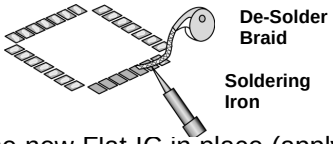
1. Cut the pins of the defective IC with the wire cutter pliers, and remove it completely away from the board. If the IC is glued to the board, apply hot air to complete the removal. **CAUTION**- Do not pull or twist the pliers, it may damage the soldering pads in the board.



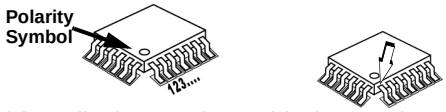
2. Using the Soldering Iron and the long nose pliers, remove the IC pins that are still attached to the board.



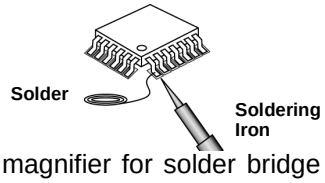
3. Using the De-solder braid and the Soldering Iron, remove the solder from the board soldering pads.



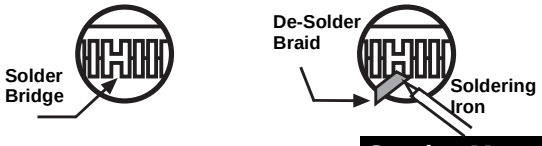
4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol. Start aligning and soldering Pin No.1, then align and solder the pin in the apposite corner of the IC, this will help to align the rest of the pins.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.



Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the PTV to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground ((⏚) or (⏚)) when servicing, or incorrect voltages will be measured.

WARNING: This PTV has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers listed in this service manual, or provide the chassis number and the part reference number.

For optimum performance and readability, all other parts should be replaced with components of identical specification.

Feature Table

FEATURE	PT-51HX41E/CE PT-56HX41E/CE PT-61HX41E/CE
Chassis	P5P
Tunning system	256K
# of channels	181
Menu language	Eng/Span/Fr
Closed Caption (CC)	X
V-Chip (USA/CANADA)	X
Picture In Picture (PIP)	2T split
VIDEO INPUT MEMORY/SKIP	SKIP
2RF	X
Remote control #	EUR7603Z20
Screen protector	X
Comb filter	3D Y/C
COLOR TEMP	X
NEW YNR	X
VM	X
V/A norm	Both
DIGITAL SCAN RATE	1080i, 480p
NTSC LINE-DOUBLER	480i
MTS/SAP/DBX	X
Bass/Bl/Treb control	X
AI sound	X
SURROUND	X
Spatializer/BBE	BBE
Built-in audio power	15W/CH (10%)
# of speakers	2
A/V in (rear/front)	4 (3/1)
S-VHS in (rear/front)	2/1
Audio out	Fixed & Variable

Table 1: **Feature Table**

FEATURE	PT-51HX41E/CE PT-56HX41E/CE PT-61HX41E/CE
COMPONENT INPUT (Y, Pb, Pr)	2
DOLBY CENTER CHANNEL IN	X
51" Dimensions WxDxH mm WxDxH in	1137x653x1361.0 44.8x25.7x53.6
51" Weight (kg/lbs)	90/198.4
56" Dimensions WxDxH mm WxDxH in	1197x685x1418 47.1x27.0x55.8
56" Weight (kg/lbs)	111.5/245.8
61" Dimensions WxDxH mm WxDxH in	1316x708x1516 51.8x27.9x59.7
61" Weight (kg/lbs)	117.5/259.0
Power source (V/Hz)	120V 60Hz
Anode voltage	31.5kV ± 1.0kV
Video input jack	1Vp-p 75Ω, phono jack
Audio input jack	500mV RMS 47kΩ

Table 1: **Feature Table (Continued)**

Specifications are subject to change without notice or obligation. Dimensions and weights are approximate.

Boards Designation

BOARD	PART NUMBER	BOARD DESCRIPTION
G-BOARD	TNP2AA088	FRONT A/V INPUTS
K-BOARD	TNP2AA087	KEYBOARD
R-BOARD	TNPA0615AB	IR SENSOR
LR-BOARD	TNPA1810	RED DRIVER
LG-BOARD	TNPA1811	GREEN DRIVER
LB-BOARD	TNPA1812	BLUE DRIVER
A-BOARD	TNPH0370	MAIN CHASSIS, VIDEO PROCESSING, CONVERGENCE, AUDIO PROCESSING
DH-BOARD	TNPA2033	PIP PROCESSING, SPLIT, SEARCH, FORMATS
D-BOARD	TNPH0371	POWER SUPPLY, VERTICAL OUT, HORIZONTAL OUT

Table 2: **Boards Designation**

Note: ***The A-Board (*TNPH0370S*) and DH-Board (*TNPA2033S)*** *are* ***Non-Serviceable****. Except for A-Board both Tuners, IC2302, IC7001, IC7002 and IC870. If any of these components or boards is defective repleace it with a new one and take back the defective board to the service center.*

Notice: *When ordering any Board, add and " S" after the Board suffix application.*

Example: *If Order A-Board, should be ordered as:* TNPH0370*S.*

PTV - Location of Controls

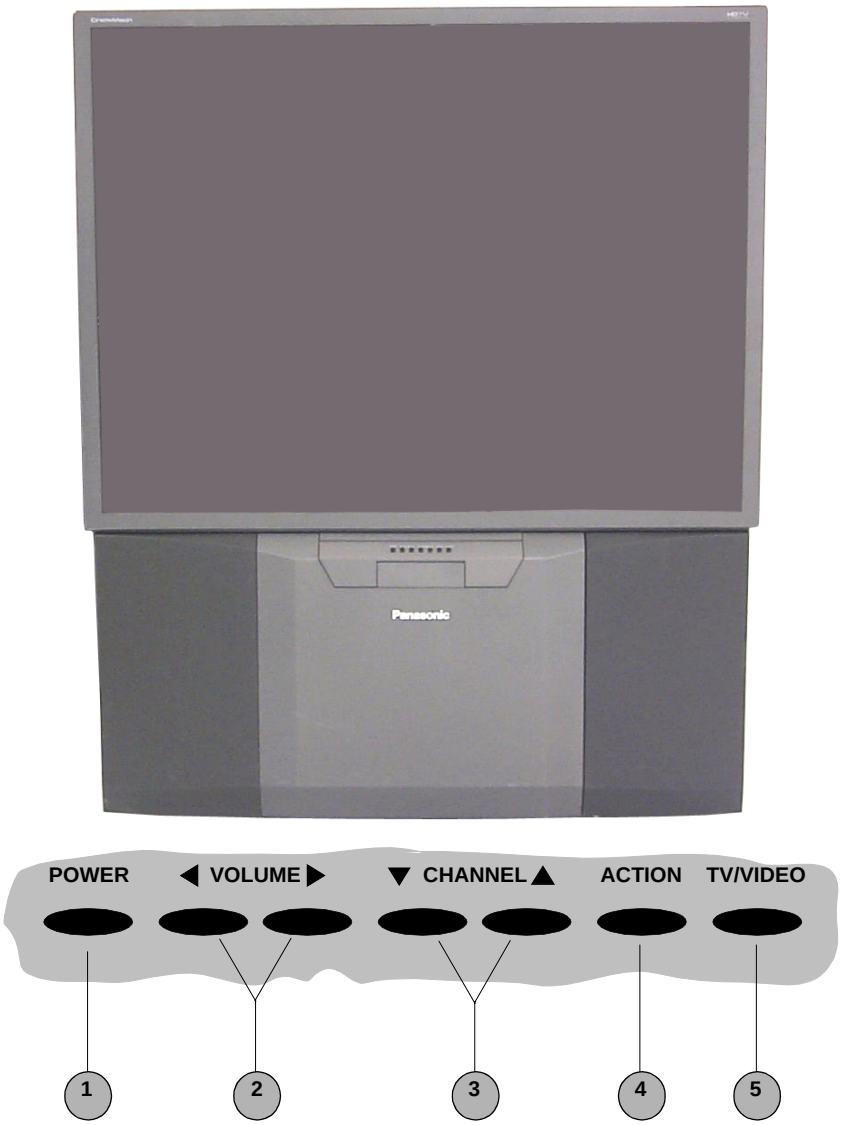


Figure 5. **Location of Controls PTV**

Quick Reference Control Operation

Quick Reference Control Operation	
1	**Power -** Press to turn ON or OFF.
2	**Volume -** Press to adjust Sound Level, or to adjust Audio Menus, Video Menus, and select operating features when menus are displayed
3	**Channel -** Press to select programmed channels. Press to highlight desired features when menus are displayed. Also use to select Cable Converter box channels after programming Remote Control Infra-red codes (the TV/AUX/CABLE switch must be set in CABLE position).
4	**Action -** Press to display Main Menu and access On Screen feature and Adjustment Menus.
5	**TV/Video -** Press to select TV or one of the Video Inputs, for the Main Picture or the PIP frame (when PIP frame is displayed).

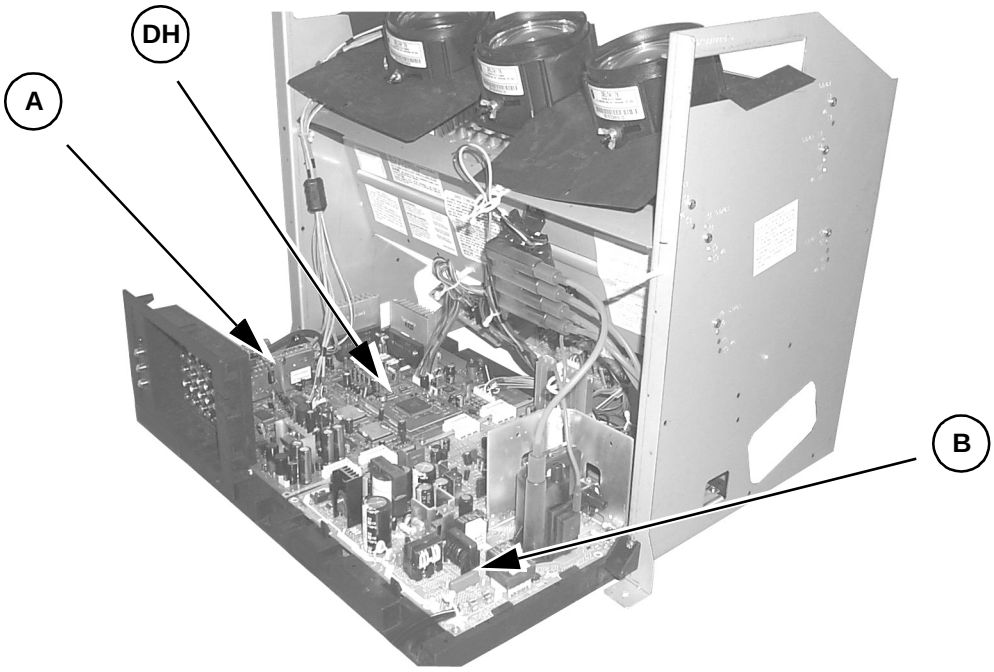
Remote - Location of Controls

POWER Button
Press to turn ON and OFF.
MUTE Button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption display.
TV, VCR, DVD, CBS/CBL
Component function buttons
VOL (volume) Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.
R-TUNE (Rapid Tune) Button.
Press to switch to the previous channel.
ACTION Button
Press to display Main Menu and access or exit On Screen features and Adjustment Menus.
REW, PLAY, FF, TV/VCR, STOP, PAUSE, REC & VCR CHANNEL Buttons
Component function buttons.
DBS EXIT& DBS GUIDE Buttons
DBS function buttons.
LIGHT Button
Press to light remote control buttons.
SAP
Access second audio program
ASPECT
Select picture size (ratio) to match programming format
MOVE, PIP, SPLIT/SIZE, FREEZE, SWAP, SEARCH, PIP CHANNEL
PIP function buttons

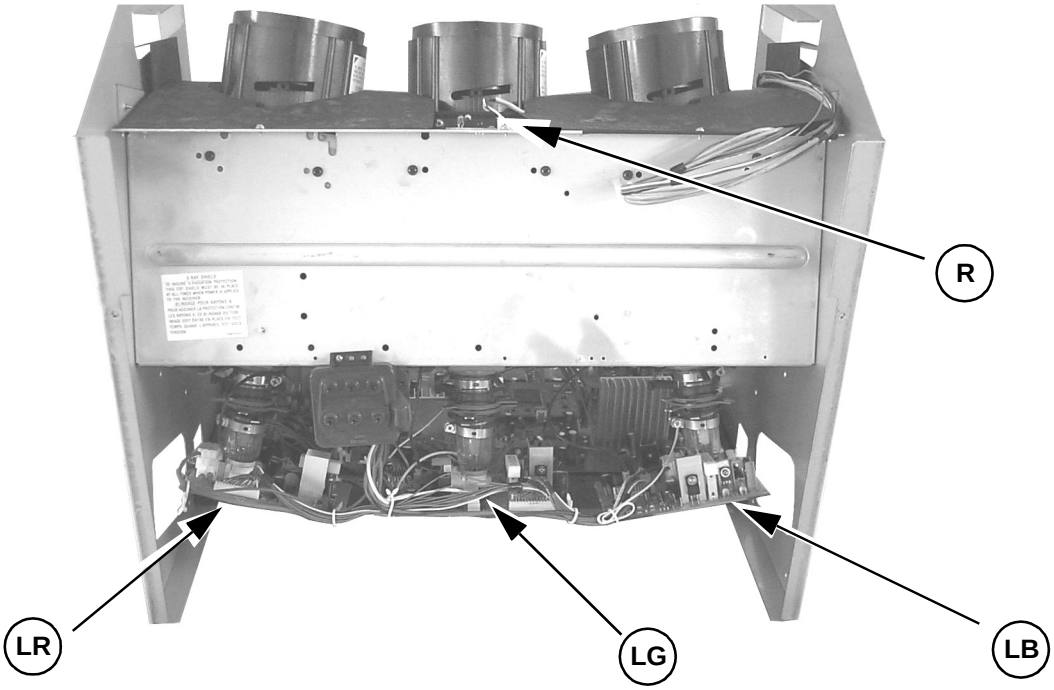
Figure 6. L**ocation of Controls (EUR7603Z20 Remote)**

For additional information for this remote please refer to the Remote Guide, listed on the parts list.

Chassis & Boards Layout



Front Corner View



Back View

Figure 7. Chassis & Boards Layout.

Board Description

A	Main Chassis, Video Processing, Convergence, Audio Processing	LB	Blue CRT Output
		LG	Green CRT Output
D	Power Supply, Vertical Out, Horizontal Out	LR	Red CRT Output
DH	PIP Processing, Split, Search, Formats	R	IR Sensor

Disassembly for Service

Note: Board ground wires may have to be disconnected to disassemble some boards. All ground wires must be reconnected using jumper leads, if necessary, before power is applied to PTV for service.

Speaker Grille Removal

(Figure 8.)

1. The 2 Speaker Grilles are secured to the wooden base of PTV. Grip each panel from the sides and botton part, gently pull forward to remove. When reassembling, make certain to firmly press on the panel where the insertion points (4) are located, one on each corner.
2. The Center Front Cover is secured by 4 screws.

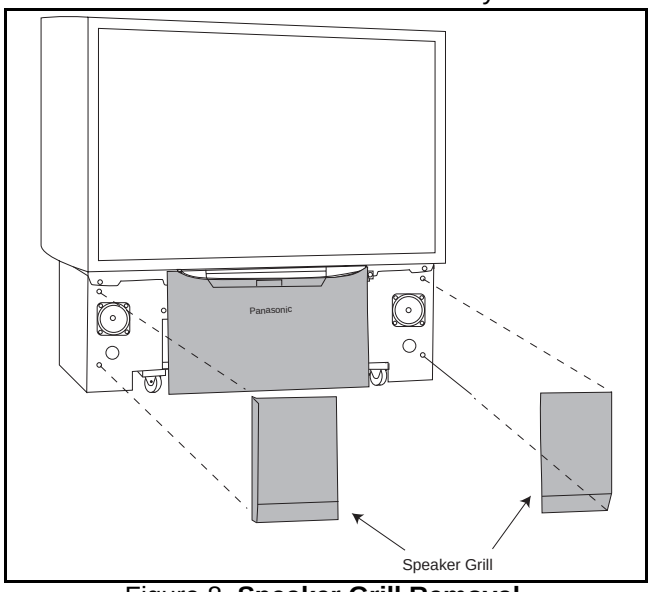


Figure 8. **Speaker Grill Removal.**

Keyboard Removal (7-Key Button)

(Figure 8)

1. Remove the Speaker Grill. (see Figure 8)
2. Unplug the cables (2) from the Keyboard assembly. Remove the 2 screws from the left and right sides of Keyboard assembly. Tilt the Keyboard assembly upward and release it from the screen frame assembly.

Speakers Replacement

1. Remove the speakers grill. (see Figure 8)
2. Each speaker set is secured to the cabinet with (4) screws.
3. Disconnect the R & L speaker lead connectors from the speaker units.

Cabinet Back Lower Removal

(Figure 9)

1. Remove (7) hex screws around its perimeter marked with arrows. (See Figure 9 for screw location).
2. Remove (3) screws from around the A/V terminal board (marked with arrows).

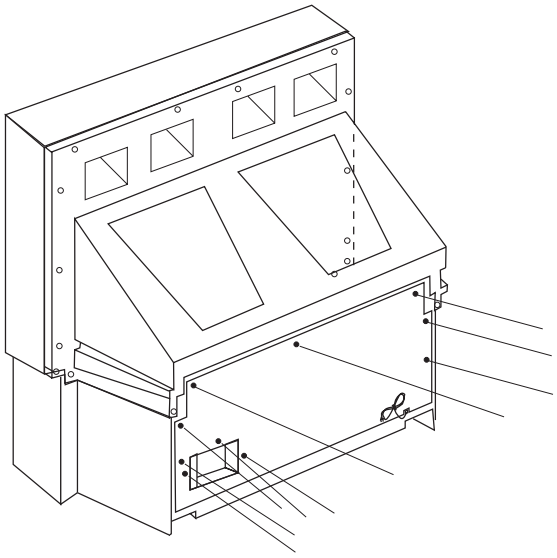


Figure 9. **Lower Cabinet Back Removal**

Cabinet Back Cover Removal

(Figure 10)

1. First remove the Cabinet Back Lower Cover.
2. The top back cover is secured with (16) screws around its perimeter (See Figure 10 for screws location).
3. Be careful not to damage the mirror attached to the underside of cover.

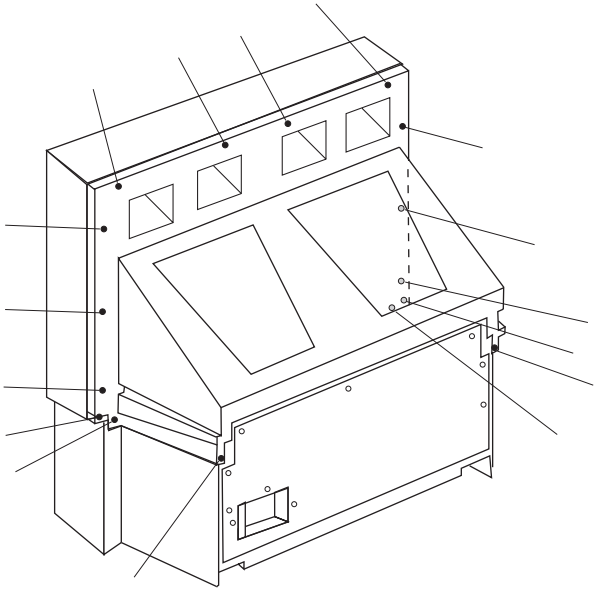


Figure 10. **Cabinet Back Cover Removal**

Disassembly for Service (Continued)

Cabinet Front Removal

(Figure 11)

1. First remove the Speaker Grill and the center cover, then remove the keyboard, then remove the bottom back cover and then the top back cover.
2. At this point the front cabinet is only held by two hex screws shown below, be careful not to push the cabinet to front.
3. Remove (2) hex cabinet screws (See Figure 11)

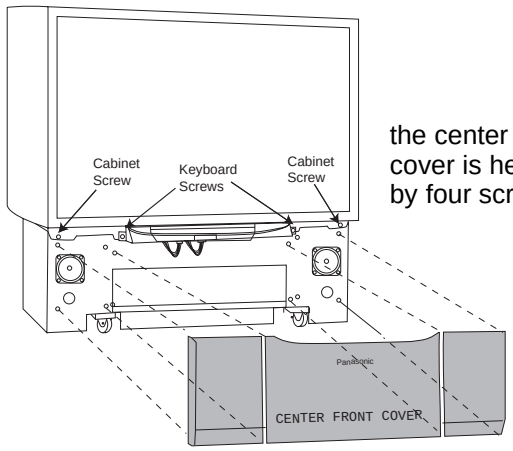


Figure 11. **Front Cabinet Removal**

Screen Assembly

(Figure 12)

1. First remove the Front Cabinet (See Front Cabinet Removal procedure)
2. Place Front cabinet face down on a soft surface.
3. Remove screen brackets from all sides and corner brackets

Note: *Notice upper, lower, left and right brackets painted in black (permanent marker) on edge, to avoid reflection on image.*

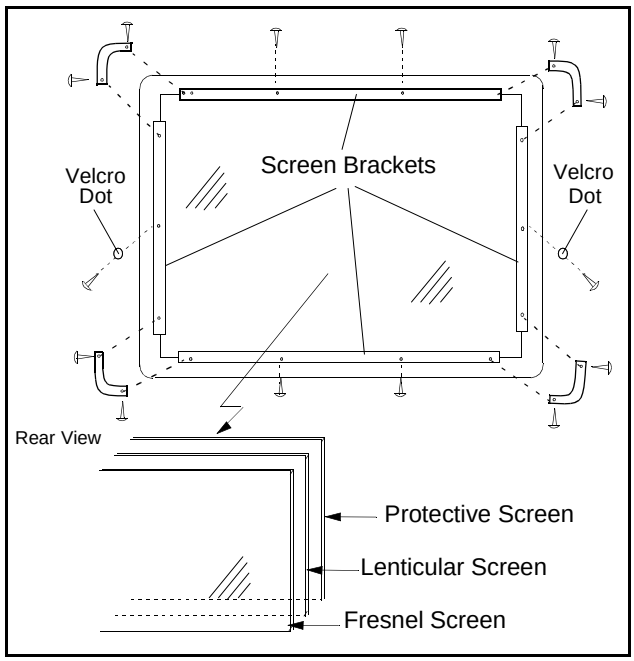


Figure 12. **Screen Assembly**

4. Note exact orientation of each screen. The orientation and order of the screens is critical for projecting pictures properly. Detailed screen assembly can be seen in Figur e20.

Main Chassis Block (Light-Box)

(Figure 13)

1. Remove the Speaker Grill (Figure 8)
2. Remove the cabinet back lower. (Figure 9)
3. The main chassis block is secured to the cabinet by screws (2 at front, behind the decorative panel, 4 inside on the bottom of the optical frame).
4. Remove the horizontal barrier panel at the back of the cabinet.
5. Unplug connectors (K1, G1 and speaker connectors) and pull out the main chassis block.

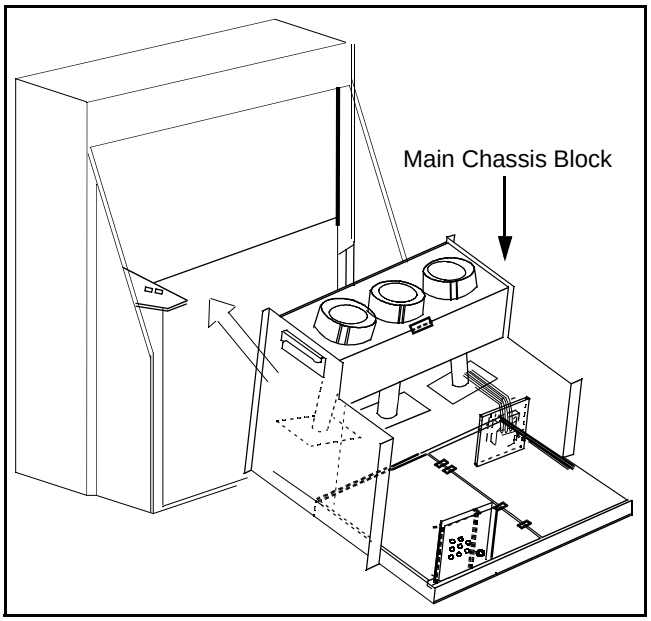


Figure 13. **Chassis Removal (Light-Box)**

Note: *Main Chassis block can be serviced either in normal position or laying on its back (Protect hookup terminal from damage).*

Disassembly for Service (Continued)

Disassembly for CRT Replacement

To facilitate CRT replacement, the complete CRT mounting chassis does not need to be removed.

1. Remove the main chassis block from the cabinet (Figure 13).
2. Remove the Optical bracket metal cover (rear side) by removing (6) screws from back, (2) screws from top, and (2) screws from each side. (Figure 14)

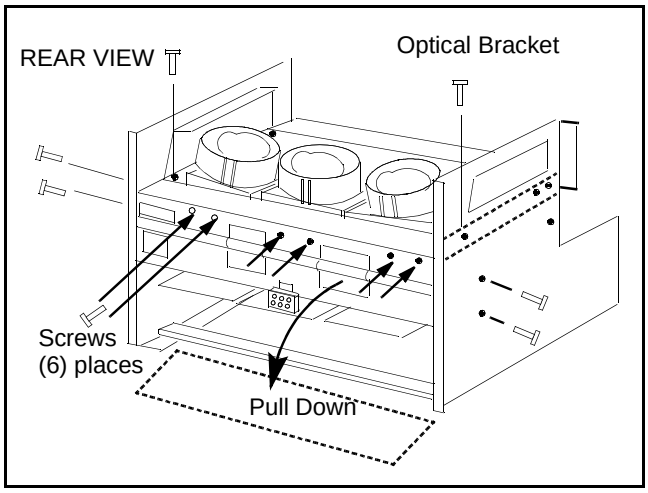


Figure 14. **CRT Replacement**

3. Remove the defective CRT anode lead from the high voltage distributor block that is mounted on the Flyback Transformer. Discharge to CRT chassis.
4. Unplug connectors from the B-Board. (See board layout.) B9 for red, B10 for green, or B11 for blue.
5. Unplug the defective CRT black DAG ground connector from the CRT Board.
6. Remove the CRT Board from the defective CRT neck.
7. Remove (2) screws from the defective CRT housing (Figure 15).**

CAUTION: Do not remove the (4) CRT lens screws.

8. Release CRT anode lead from CRT chassis wire clamp and all other wires from holders.
9. Loosen a screw that secured the DY and remove it from the CRT neck.

X-RAYS SHIELD ⚠

10. To insure X-Rays radiation protection, the lens must be mounted in place at all times when power is applied to the PTV.

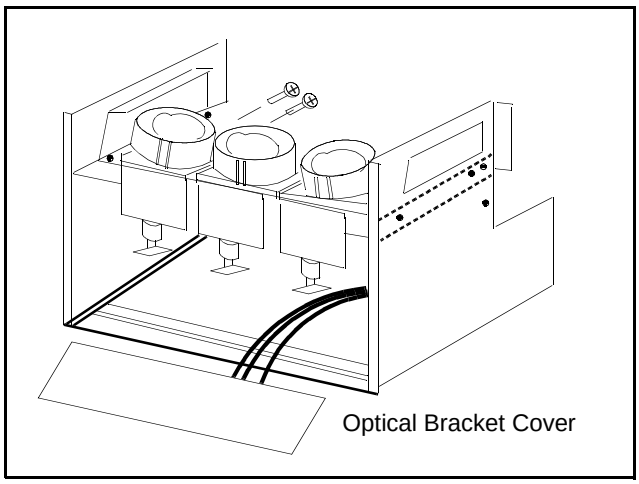


Figure 15. **CRT Replacement.**

**** CAUTION:** Support the CRT Assembly when loosening screws.

CRT Replacement

1. Remove CRT focus lens assembly (4 screws).

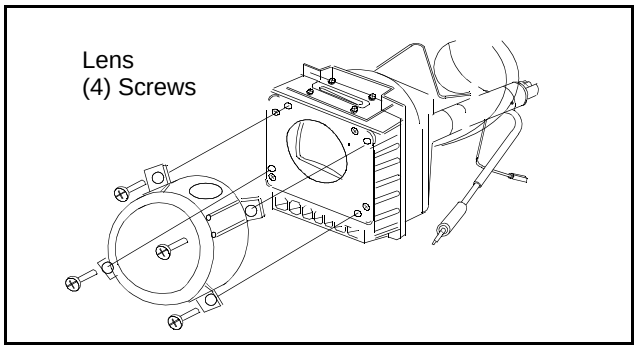


Figure 16. **CRT Assembly**.

2. Lay CRT face down on a soft cloth.
3. Note position of yoke with centering tabs and remove from defective CRT.
4. Remove CRT DAG ground from defective CRT. Mount it on the replacement CRT exactly as it was on the defective CRT.

Note: *Replacement CRT is supplied with H.V. anode lead attached.*

When replacing CRTs, please see the part number on the CRT to be replaced and order with same part number on that CRT.

5. Wire the anode lead wire.

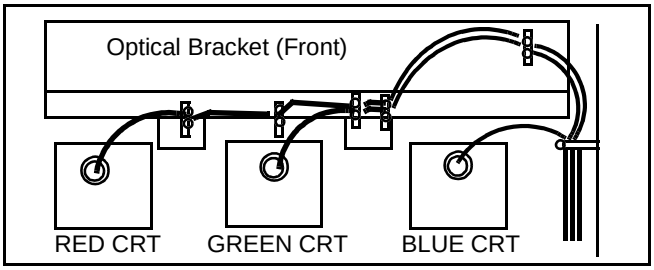


Figure 17. **Wire Guide**.

6. Install yoke with other CRT neck assemblies on CRT neck in the same order and position as removed from the defective CRT.
7. Press yoke against bell of CRT and tighten the clamp just snug enough so it will not easily shift.
8. Assemble CRT focus lens assembly to new CRT with (4) screws. Make sure focus lens adjustment nut is in the same location as on other CRT focus lens.

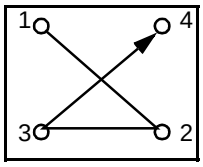


Figure 18. **CRT Screw Tightening Order**.

Note: *Please assemble with screws in the order shown and tighten with the same torque.*

Optical Block Position Adjustment

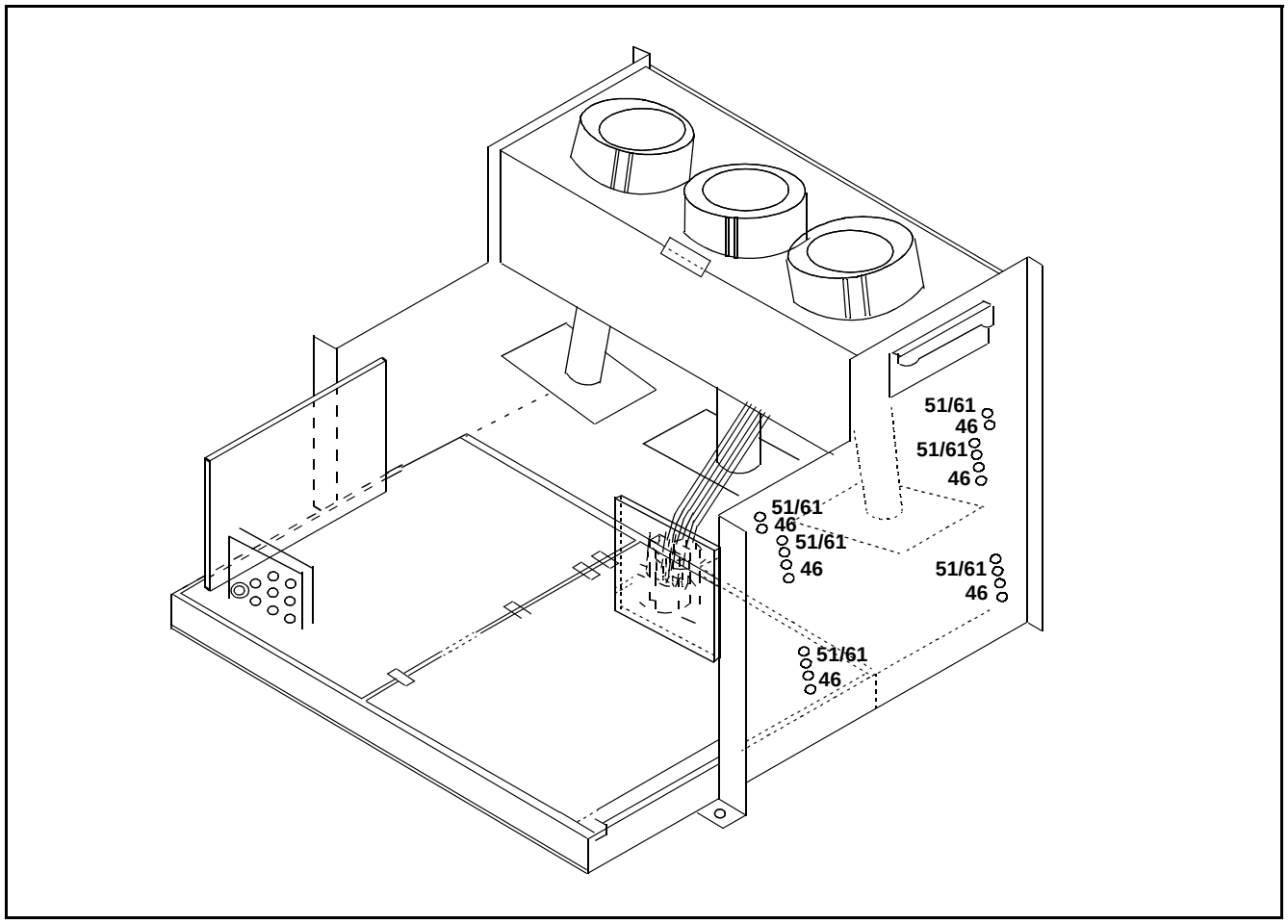


Figure 19. **Optical Block Position**.

The optical block mounting has holes to allow for the different size projection screens. These mounts will adjust to 61 inch & 51 inch projection screens.

If the optical block is removed for service or is replaced, it is important that the correct mounting holes are used.

PTV Screen Assemblies

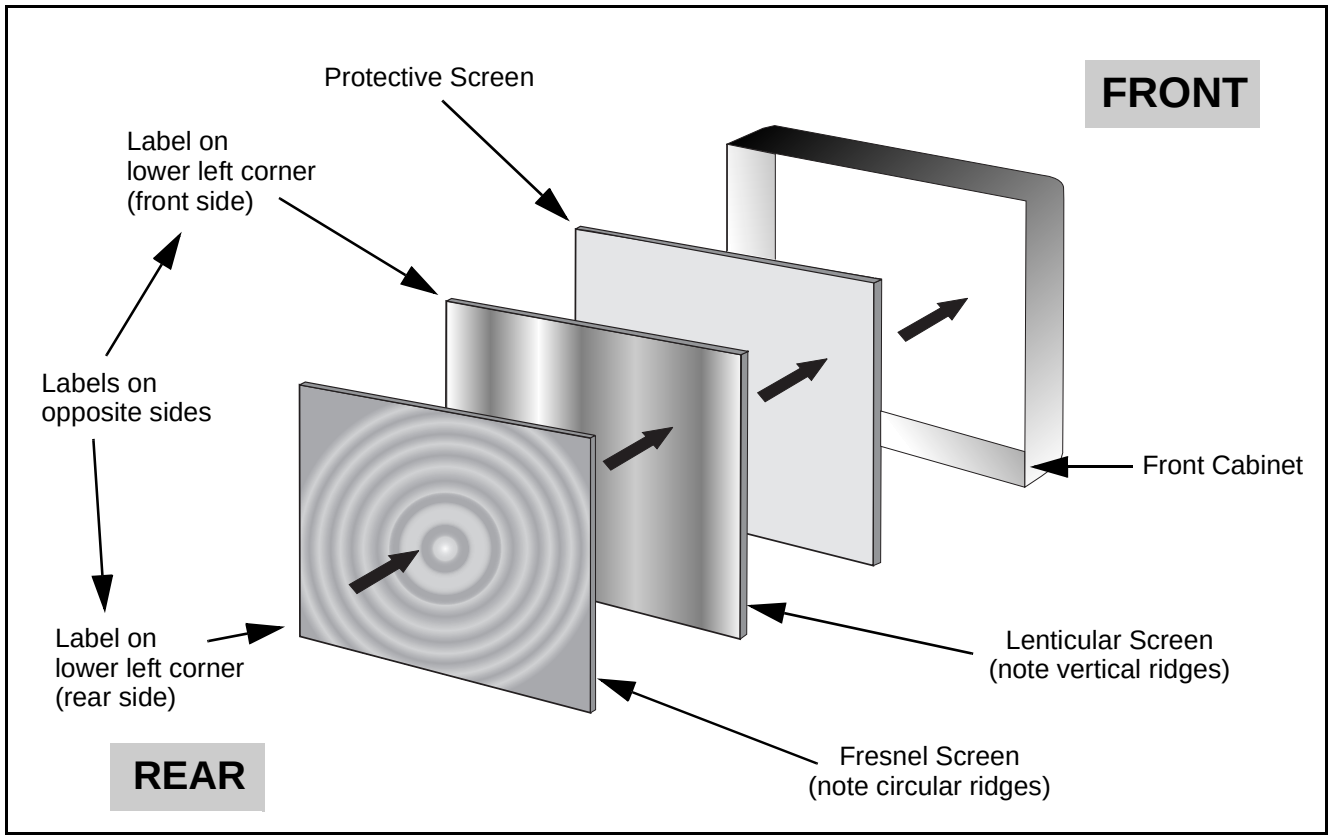


Figure 20. **Screen Assemblies.**

B+ Voltages Table

Preparation:
Set the following controls

Picture.....Normal.
Bright .....Normal.
Volume .....Min. (0).

Procedure:

1. Apply a monoscope pattern.
2. Connect the (-) Lead of the Digital Voltmeter to TP GND1 (Cold Ground).
3. Connect the (+) Lead of the Digital Voltmeter to each Test Point and confirm the B+ Voltages (See Table 3).

No.	Test Point (D-Board)	Voltage
1	TPD14	138.6±1.0
2	TPD13	19.0±1.5
3	TPD12	19.0±1.5
4	TPD11	-19.0±1.5
5	TPD10	22.0±1.5
6	C845 (-)	-22.5±1.5
No.	**Test Point (A-Board)**	**Voltage**
1	TPA031	9.0±0.5
2	TPA030	5.0±0.5

Table 3: **B+ Voltages Table**

CRT Set Up

CAUTION: Insure yoke plugs on the A-Board are reconnected before turning the PTV ON to prevent damage to the horizontal output transistor and/or CRTs.

1. Connect test generator to the antenna terminal and set for a monoscope pattern.
2. Loosen yoke clamp, seat yoke against bell of CRT and rotate to correct yoke tilt (compare to adjacent CRT). Tighten yoke clamp.
3. Remove adhesive from centering tabs and set centering tabs for zero correction. (Figure 21)

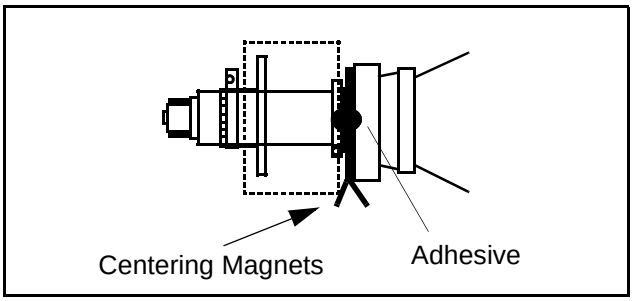


Figure 21. **Adhesive Removal**

4. Cover replacement CRT lens and static converge the tubes not replaced, if needed. Check size and linearity of pattern and adjust as required.
5. Uncover replacement CRT lens and cover other two CRT lenses. Adjust electrical and optical focus (lens), if required.
6. Uncover all CRT lenses and use yoke centering magnet to converge replacement CRT (in center area of screen only) with other two CRTs. Disregard non-convergence in areas other than center area.
7. Perform White Balance adjustments.

Dynamic Focus Adjustments

1. Focus adjustments should be performed after 1 hour of aging.
2. Use oscilloscope with 100 : 1 probe.
3. Apply monoscope pattern.
4. Adjust the red, blue and green focus VR on the focus block for best focus of overall picture of each CRT. (Figure 24)

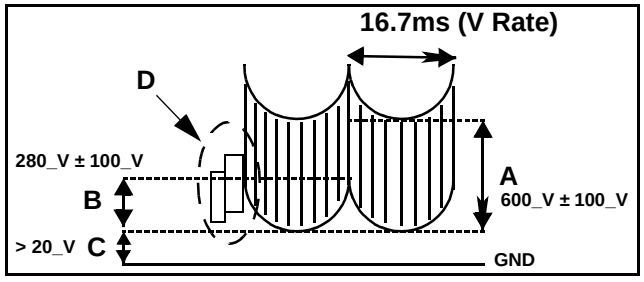


Figure 22. **D. Focus Adjustment Waveform**

5. To change DAF DATA, enter to service mode, then press POWER on remote to display DACs menu, then select DAC by pressing CH (RIGHT/LEFT) and VOL (UP/DOWN), then press ACTION to enter to DAC, then adjust by pressing VOL (RIGHT/LEFT); press ACTION, to save press ACTION again or OTHER to exit without saving.

Procedure:

1. Enter to Service mode and set the following default DATA:
- H-PAR to +263
- V-SAW to -35
- V-PAR to +117

2. Connect the scope probe to TPD30, GND to TPD31.
3. Confirm that level of A is 600_V ± 100_V, adjust H-PAR DAC to set to specification level.
4. Confirm that level of B is 280_V ± 50_V, adjust V-PAR DAC to set to specification level.
5. Confirm that level of C is more tha 20 V, adjust H-PAR DAC to set to specification level.
6. Confirm that the waveform shown in D appears (See Figure 22)

Focus - Electrical & Optical Adjustments

(use for minor adjustment or for final adjustment, for complete adjustment see following section.)

Electrical Adjustment

1. Apply NTSC monoscope pattern.

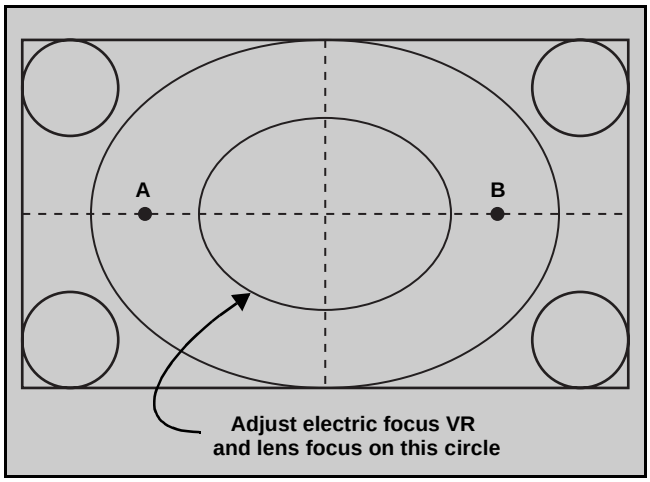


Figure 23. **Lens focus adjustment**

Table 4: **Focus Points**

	RED	GREEN	BLUE
Electric focus	B	A/B	A
Optical Focus	B	A/B	A

2. Cover the green and blue CRTs, projecting red only. The electrical focus controls are located on the front (Figure 23). Adjust the red focus VR for best focus as indicated in Table 4).

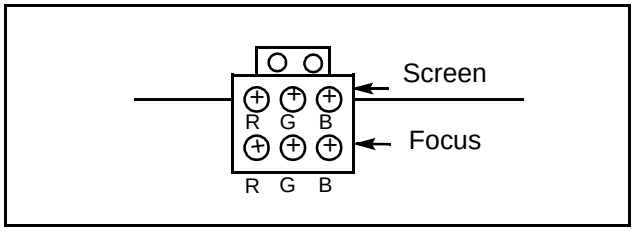


Figure 24. **Focus Pack**

3. Adjust red lens focus (mechanical) until focus is best.
4. Adjust red focus VR again.
5. Repeat for blue focus VR while projecting blue only.
6. Repeat for green.

Focus - Optical Lens Adjustment
Optical Adjustments

Note: *This adjustment normally should not require resetting unless the lens has been replaced or adjustment has changed.*

1. Optical focus adjustment is located on the top of each CRT lens system. Loosen the adjustment knurled locking knob. (Figure 25)

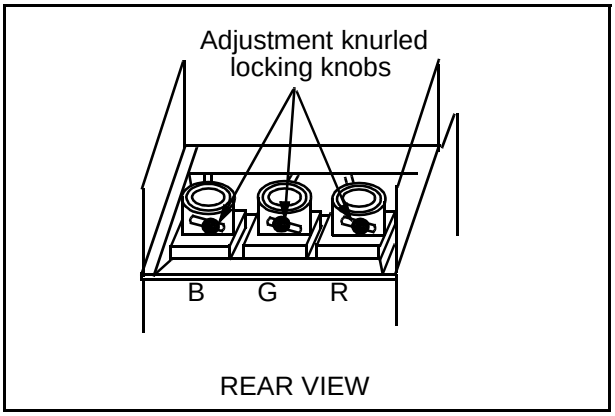


Figure 25. **Optical Lens focus Adjustment**

2. Turn the PTV ON. Apply and view a monoscope pattern.
3. Adjust each lens focus for best focus while viewing each CRT.
4. Cover the red and blue CRT, projecting green only. Rotate the green lens for best focus around screen center area.
5. Do the same for the red focus lens while projecting red only.
6. Repeat for blue.

Electric & VM Focus Adjustment, Complete adjustment

(Perform this adjustment when a CRT is replaced or when major adjustment is required)

Preparation:

1. NTSC monoscope pattern.
2. NTSC cross hatch pattern with dots (pincushion).
3. Set DAC MUTE from 0 to 1 (disabling digital convergence.)
4. Position the longer tab of the four-pole magnet to 90 degrees (uncorrected position). (See Figure 27).

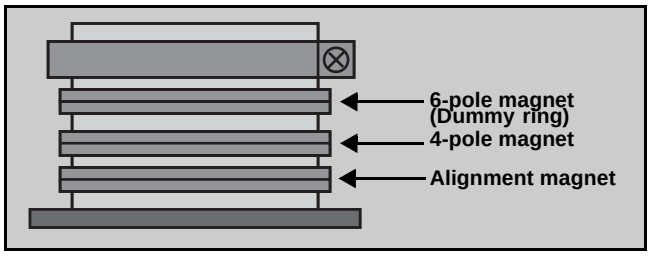


Figure 26. **VM Coil with focus correction magnet**

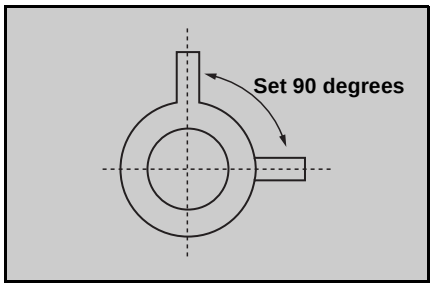


Figure 27. **4-pole magnet**

5. Position the long tab of all alignment magnets and of the dummy ring together in an uncorrected position. (See Figure 28).

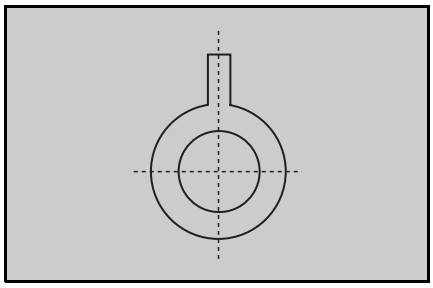


Figure 28. **Alignment magnet (or dummy ring)**

Procedure:

1. Apply an NTSC cross hatch pattern with dots.
2. Assure that digital convergence is disabled (Dac MUTE from 0 to 1).
3. Project red only. (Cover green and blue CRTs.)
4. Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and note the position of the dots at the center of the picture.
5. Turn the red electrical focus adjustment VR fully clockwise.
6. If the position of the dots at the center of the screen moves from the position noted in step 4., adjust the four pole magnets until the dots are in the same position as noted in step4.
7. Turn the red electrical focus adjustment VR (on focus pack) fully counterclockwise and confirm that the position of the dots at the center of the screen did not move from their position noted in ste p6.
8. If the position of the dots at the center of screen moved, repeat from step 4.

9. If the position of the dots moved after repeated adjustments, adjust until the movement of the dots is minimized.
10. Turn the red focus VR fully clockwise.
11. Adjust the 4-pole magnets until the shape of the dots at the center of the screen is circular.
12. Adjust red focus VR until optimum focus is achieved.
13. Apply NTSC monoscope pattern.
14. If the center of the monoscope pattern is not inside the 15.0mm circle, shown in Figure 29, adjust the centering magnets. Repeat the alignment magnet adjustments and four pole magnet adjustments (step 1. ~ step 12.).

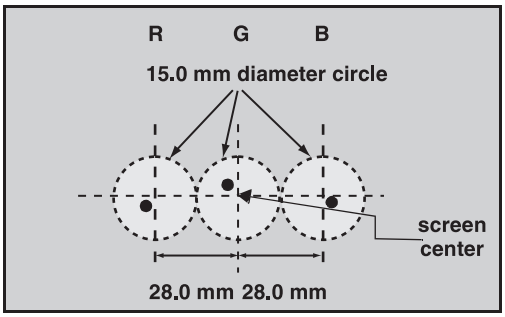


Figure 29. **Centering magnet**

15. Apply an NTSC cross hatch pattern with dots.
16. Cover red and blue lenses projecting green only.
17. Repeat above procedures for the green.
18. Enable digital convergence by changing DAC MUTE from 1 to 0.
19. Following adjustments, paint position of DY centering magnets and fix the centering magnets of DY, dummy rings of VM coil, four pole magnets of VM coil and the alignment magnets of VM coil to prevent them from moving.

Note: *Please See "Serviceman Mode (Electronic Controls)" on page 25 for entering and exiting Service Mode.*

Vertical Size Adjustment (VSIZE)

1. Apply an NTSC monoscope pattern.
2. Cover red and blue lenses.
3. Set DAC MUTE from 0 to 1 (disabling digital convergence).
4. Adjust centering magnets so that the center of pattern get aligned with screen frame center.
5. Adjust DAC (VSIZE) until vertical size is 3.5±0.1 on top and bottom lines. (See Figure 30)
6. Remove lens covers and enable digital convergence by changing DAC MUTE from 1 to 0.

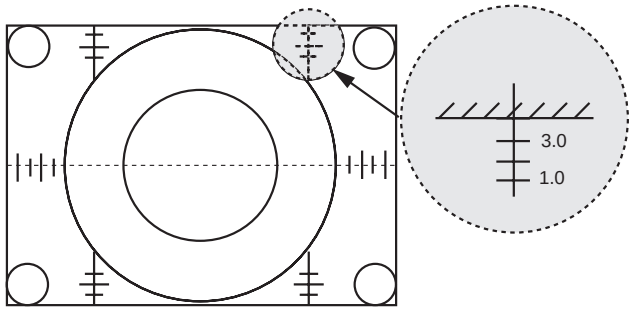


Figure 30. **Vertical Size Adjustment**

Horizontal Phase Adjustment (H-POS)

1. Apply a crosshatch pattern.
2. Set DAC MUTE from 0 to 1 (disabling digital convergence).
3. Cover both red and blue lens so that only the green lens is projecting the monoscope pattern.
4. Turn Green deflection yoke until line is perfectly horizontal.
5. Adjust H-POS DAC data so that pattern is in the center of screen.

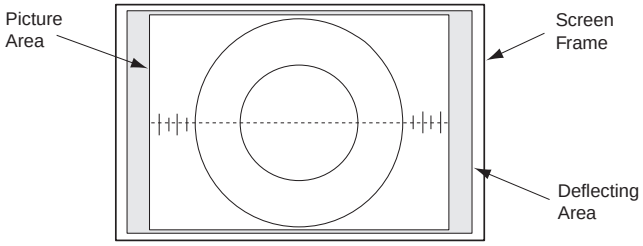


Figure 31. **H Phase Adjustment**

6. Enable digital convergence by changing DAC MUTE from 1 to 0.
7. Remove lens covers.

Trapezoid Adjustment (EWTRA)

Procedures:

1. Cover Red and Blue Lenses.
1. Apply a crosshatch pattern.
2. Set DAC MUTE from 0 to 1 (disabling digital convergence).
3. Adjust DAC EWTRA (trapezoid) by pressing VOL right-left to correct image, less than 30mm on top and bottom left side(See Figure 32).

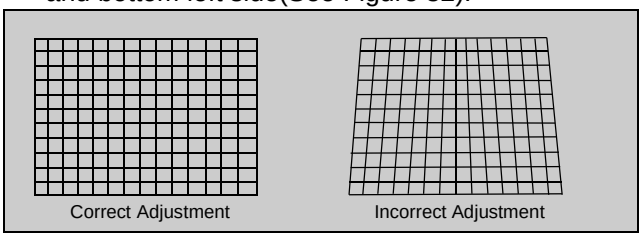


Figure 32. **Trapezoid Adjustment**

4. Enable digital convergence by changing DAC MUTE from 1 to 0 and remove caps from lenses.

Pincushion Adjustment (PCC)

Procedure:

1. Cover Red and Blue Lenses.
2. Apply a crosshatch pattern.
3. Set DAC MUTE from 0 to 1 (disabling digital convergence).
4. Adjust DAC PCC (Pincushion) by pressing VOL right/left and confirm that size is 17±5mm at "A" (See Figure 33)

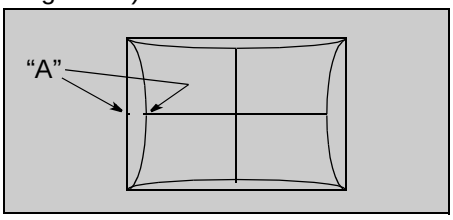


Figure 33. **Pincushion Adjustment**

5. If Trapezoid adjustment is required after this adjustment, perform trapezoid adjustment.
6. Enable digital convergence by changing DAC MUTE from 1 to 0 and remove caps from lenses.

Centering Magnets Adjustment

Procedures:

1. Apply a monoscope pattern.
2. Cover the red and blue lens so only the green lens is projecting the monoscope pattern.
3. Set DAC MUTE from 0 to 1 (disabling digital convergence).
4. Loosen the deflection coil screw on the green CRT.
5. Adjust green deflection coil until the horizontal center line is horizontal.
6. Adjust centering magnets until the green pattern is equal on left and right. Adjust also for horizontal and vertical tilt.

Note: *Push deflection coil to top of CRT neck, then tighten deflection screw after adjusting each CRT centering and Tilt.*

7. Transfer lens cover from red to green and project red only. Adjust deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
8. Adjust red centering magnets until the monoscope pattern center is at the appropriate distance as indicated on Figure 34.

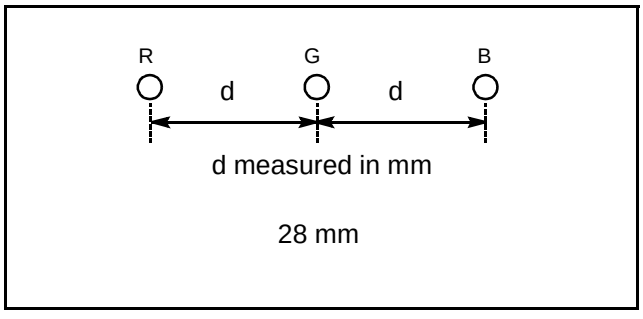


Figure 34. **Centering Magnets Adjustment.**

9. Transfer lens cover from blue to red, so that blue is projected.
10. Adjust blue deflection coil until the horizontal center line matches the pattern of the grid and is leveled.
11. Adjust blue centering magnets until the monoscope pattern center is at the appropriate distance as indicated on Figure 34.
12. Enable digital convergence by changing DAC MUTE from 1 to 0.
13. Following the adjustment, make sure that all deflection coils are pushed completely toward the CRT cones and that all screws are tightened.

Horizontal Size Adjustment (H WID)

This is the manual adjustment of horizontal size that is included in the automatic convergence adjustment.

1. Apply a monoscope pattern.
2. Set DAC MUTE from 0 to 1 (disabling digital convergence).
3. Cover both red and blue lens.
4. In service mode, adjust H-WID DAC until the picture horizontal size is 5.0 ± 0.2 lines at left side of screen.
5. Enable digital convergence by changing DAC MUTE from 1 to 0.
6. Remove lens covers.

Convergence Adjustment

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*

Turn PTV on and allow it to warm up for 30 minutes prior to making adjustments (WHITE PATTERN).

Note: *This PTV uses the scheme described below to correct for misconvergence of the three CRT projection tubes. There are various modes to this operation.*

Preparation:

Place the Convergence Alignment Template (see "Convergence Alignment Template" on page 24) over the PTV screen. Align the center lines of the template with the mechanical center markers on the PTV screen frame. If the template is not available, create one using the dimensions provided in "Convergence Alignment Template" on page 24.

Remote control must be used during the procedure.

Note: *Apply the Convergence Alignment Template to the PTV screen frame to converge the **Green Raster only**. Remove the Convergence Alignment Template following this alignment. The red and blue rasters can then be aligned to the green raster.*

Raster Setup:

1. Enter to service mode (red CHK).
2. In SET-UP (Roller Guide menu) CONVERGENCE 1 set all values to 0.
3. Cover Red & Blue lens with caps.
4. Apply an NTSC monoscope pattern.
5. Select DAC COARSE, then press ACTION to enter to “CONVERGENCE ADJ” mode.
6. Press “0” key on remote.
7. Press ACTION key on remote to enter to “TEST_POS” mode.
8. Move pattern by pressing VOL right - left and CH up - down so that the cursor center overlap monoscope pattern center.

Figure 35. **Aligning cross-hair cursor with monoscope pattern**

9. Press “5” key on remote to exit superimpose mode (monoscope pattern disappear).
10. Press “TV/VIDEO” key to enter “DATA_POS” mode
11. Adjust by pressing VOL right - left so that peak of curve is the same position as center of cursor.

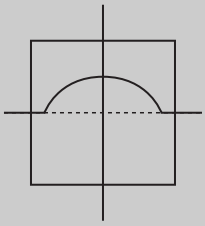


Figure 36. **Symmetrical shape**

12. Press “TV/VIDEO” key on remote to enter “OSD_POS” mode.
13. Press “5” key on remote so that monoscope pattern appears (superimpose mode)
14. Move cursor by pressing VOL right - left and CH up - down so that cursor center overlap monoscope pattern center
15. Press “0” key to go back to “CONVERGENCE ADJ” mode.
16. Press “TV/VIDEO” key to cycle through “COARSE ADJ. MODE” options.

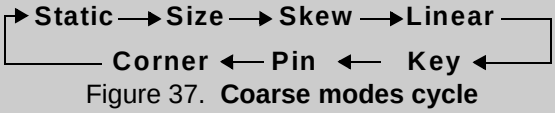


Figure 37. **Coarse modes cycle**

17. To change to “FINE ADJUSTMENT MODE” options (DAC FINE), press “TV/VIDEO” key on remote for at least 3 seconds, to go back to “COARSE ADJ MODE” options press “TV/VIDEO” on remote again for 3 seconds.
18. In “FINE ADJUSTMENT MODE” options, press “MUTE” key on remote to switch between “cursor” mode and “data” mode.
    - ***Cursor mode: Allows cursor movement by pressing VOL right - left and CH up - down.***
    - ***Data mode: Allows making adjustment by pressing VOL right - left and CH up - down.***
19. Either “COARSE ADJUSTMENT MODE” options or “FINE ADJUSTMENT MODE” options, press “R-TUNE” repeatedly key on remote to cycle through different color adjustments (R,G,B,White)
20. To store adjustments press “7”, then “ACTION” key on remote, otherwise press “POWER” then “ACTION” to exit adjustments without saving.
21. Remote Functions:
    - **1, 3. . . . . .change color view adj**
    - **2. . . . . change pattern**
    - **7. . . . . save data**
    - **5. . . . . overlap**
    - **POWER . . . . . to exit**
    - **RECALL . . . . . display values**
    - **R-TUNE . . . . . cycle colors**
    - **TV/VIDEO . . . . . .change mode**
      3 secs. . . . . change options

Coarse Adjustment Mode (COARSE)

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*

Procedure:

1. Enter to “G-SIZE” mode:
    - **DAC COARSE**
    - **Press ACTION on remote**
    - **TV/VIDEO (repeatedly)**
    - **R-TUNE (repeatedly)**
2. Press “2” repeatedly and apply the pattern of border and cross.
3. Press RECALL to display values
4. Adjust size so that the line of the border closes to the screen frame at top, bottom, left and right by pressing CH up-down and VOL right-left.

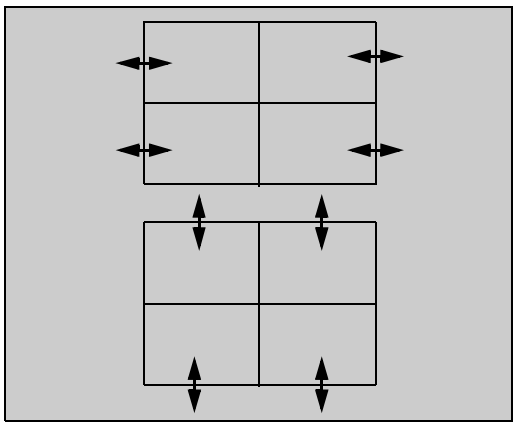


Figure 38. **H & V Size Adjustment**

5. Press “7” then “ACTION” key on remote to save changes.
6. Enter to linearity “G-LINEAR” mode by pressing “TV/VIDEO”.
7. Adjust linearity by pressing VOL right-left until A=B (See Figure 39)

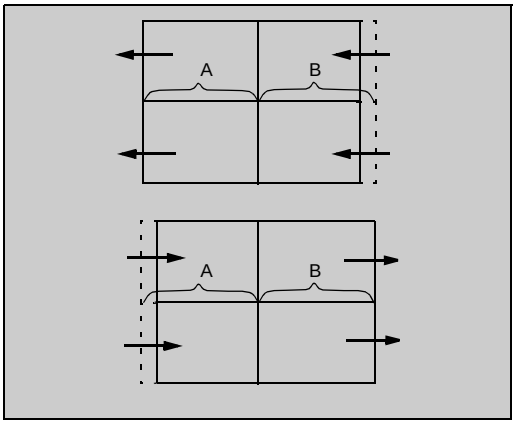


Figure 39. **Linear Mode Adjustment**

8. Press “7” then “ACTION” key on remote to save changes.
9. Enter to PIN “G-PIN” mode by pressing “TV/VIDEO”.
10. Adjust V_PIN by pressing CH up-down (See Figure 40).
11. Adjust H_PIN by pressing VOL right-left.
12. Press “7” then “ACTION” key on remote to save changes.

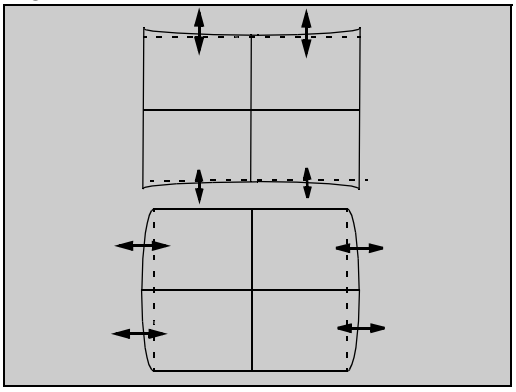


Figure 40. **H & V PIN Adjustment**

13. Enter to CORNER “G-CORNER” mode by pressing TV/VIDEO.
14. Adjust by pressing VOL right-left (See Figure 41).
15. Press “7” then “ACTION” key on remote to save changes.

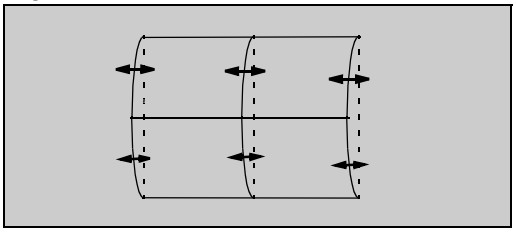


Figure 41. **Corner Adjustment**

16. Enter to KEY “G-KEY” mode by pressing TV/VIDEO.
17. Adjust by pressing CH up-down (See Figure 42)
18. Press “7” then “ACTION” key on remote to save changes

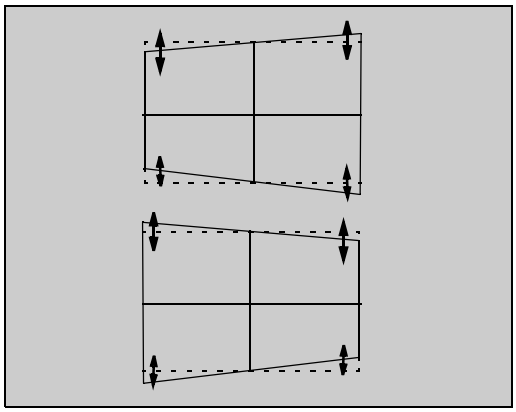


Figure 42. **KEY mode adjustment**

Note: *Confirm that pattern looks like a square and almost overlaps the screen frame, check that vertical and horizontal line center match with the marks on screen frame, if linearity is not good enough, repeat adjustments.*

19. Enter to “STATIC” mode by pressing TV/VIDEO.
20. Press “1” or “3” repeatedly until green and red only are shown.
21. Adjust “R-STATIC” so that the center of red overlaps with the center of green.

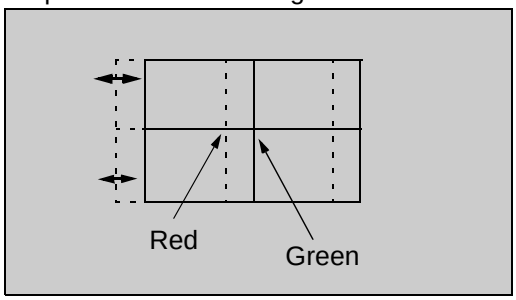


Figure 43. **STATIC mode adjustment**

22. Enter to SKEW “R-SKEW” mode by pressing TV/VIDEO
23. Adjust “R-SKEW” so that the vertical and horizontal line of center overlaps with green (See Figur e44)
24. Press “7” then “ACTION” key on remote to save changes.

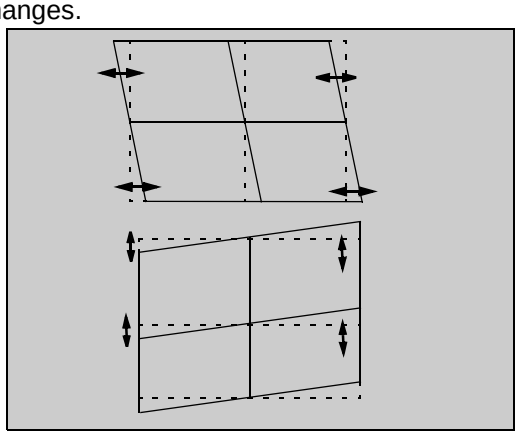


Figure 44. **SKEW adjustment**

Note: *Remember always save data following each adjustment by pressing “7” key on remote, then ACTION.*

25. Enter to LINEARITY “R-LINEAR” mode by pressing TV/VIDEO.
26. Adjust Horizontal linearity (See Figure 39)
27. Enter to SIZE “R-SIZE” mode by pressing TV/VIDEO
28. Adjust so that the line on the border closes to the screen frame at top, bottom, left and right (See Figure 38)
29. Enter to PIN “R-PIN” mode by pressing TV/VIDEO
30. Adjust horizontally and vertically (See Figure 40)
31. Enter to CORNER “R-CORNER” mode by pressing TV/VIDEO.
32. Adjust corners (See Figure 41)
33. Enter to KEY “R-KEY” mode by pressing TV/VIDEO
34. Adjust KEY (See Figure 42)
35. Display pattern of border and cross, then check that red overlaps green pattern, if it is not satisfactory, repeat from step 19.
36. Enter to STATIC “B-STATIC” mode.
37. Press “1 or 3” key repeatedly on remote until only green and blue pattern are displayed
38. Adjust B-STATIC so that the center of blue overlaps with the center of green (See Figure 45).

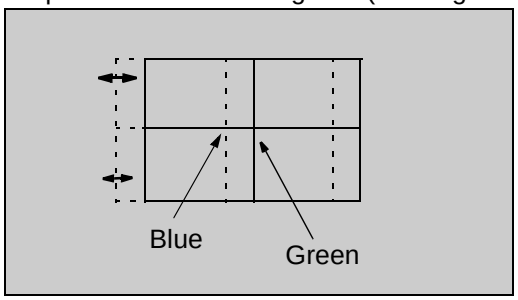


Figure 45. **B-STATIC adjustment**

39. Perform all adjustments for Blue (B-SKEW, B-LINEAR, B-SIZE, B-PIN, B-CORNER, B-KEY)
40. Display Border and cross pattern and confirm that blue overlaps with green pattern, if it is not satisfactory, repeat for blue.
41. Press “1 or 3” key repeatedly on remote until Green, Red and Blue (White), confirm that red and blue overlaps with green pattern.
42. Press “7” key on remote, then ACTION to save changes.
43. Press POWER then ACTION to exit adjustments or press TV/VIDEO for at least 3 seconds to change to Fine Adjustment Mode.

Fine Adjustment Mode (FINE) (Convergence)

Note: *It is strongly recommended to first read and understand the following section prior to make any adjustment.*

Helpful Hint:

The easiest way to adjust convergence is to begin from the center of the screen, to the border in all the convergence adjustments.

Remote Functions:

- **1, 3. . . . . .change color view adj**
- **2. . . . . change pattern**
- **7. . . . . save data**
- **5. . . . . overlap**
- **POWER . . . . . to exit**
- **RECALL . . . . . display values**
- **R-TUNE . . . . . cycle colors**
- **TV/VIDEO . . . . . .change mode**
  3 secs. . . . . change options
- **MUTE (“fine”) . . . cursor & data mode**

In “FINE ADJUSTMENT MODE” options, press “MUTE” key on remote to switch between “cursor” mode and “data” mode.

- ***Cursor mode (cursor flashing): Allows cursor movement by pressing VOL right - left and CH up - down.***
- ***Data mode (cursor fixed): Allows making adjustment by pressing VOL right - left and CH up - down.***

Procedure:

1. Enter to “G-EASY” mode (for green):
   - **DAC EASY**
   - **Press POWER on remote**
   - **TV/VIDEO (repeatedly)**
   - **R-TUNE (repeatedly)**
2. Press “2” repeatedly and apply the pattern of crosshatch.
3. Press “1 or 3” repeatedly until the pattern becomes green.
4. Press RECALL to display values.
5. In “EASY” mode, the adjustment value changes by 4 steps
6. EASY mode allows to move lines horizontally and vertically from the center of cursor.

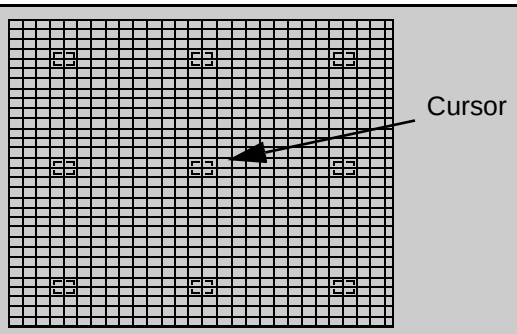


Figure 46. **EASY adjustment cursor Positions**

7. This mode afects a wide area around the cursor than other adjustment modes, See values on screen by pressing RECALL on remote (seeFigure 47)
8. Begin adjustment from the center to the edge of the screen.
9. Adjust by pressing CH up/down and VOL right/lef on the remote control when the cursor is not blinking, if the cursor is blinking press MUTE on the remote.

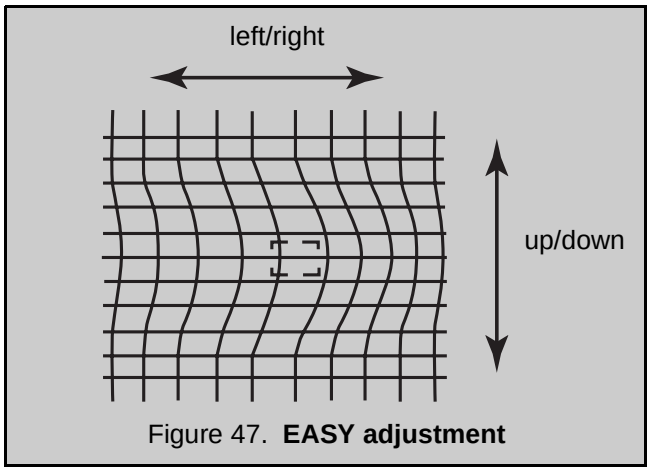


Figure 47. **EASY adjustment**

10. To move the cursor press MUTE on the remote (cursor blinks), then move the cursor to any of the 9 positions for “EASY” mode(see Figure 46)
11. This adjustment may help to make rounded lines become straight lines
12. Adjust to make lines as straight as possible
13. Enter to POINT “G-POINT” (for green) mode by pressing TV/VIDEO.
14. “POINT” mode allows to move line horizontally and vertically from the perimeter of cursor making rounded lines become straight (See Figure 48)
15. In “POINT” mode, the adjustment data changes by 2 steps, See values on screen by pressing RECALL on remote.

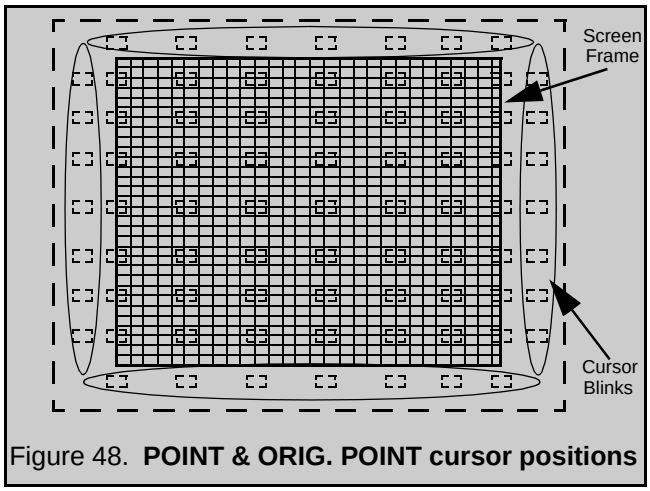


Figure 48. **POINT & ORIG. POINT cursor positions**

16. When the cursor is located in the outer area of the border the cursor starts to blink from one side to other and the adjustment is for the non-visible area (inside the ovals area, see Figure 48); This applies to “LINE”, “POINT” & “ORIGIN. POINT” modes.
17. Begin adjustment from the center to the edge of the screen.

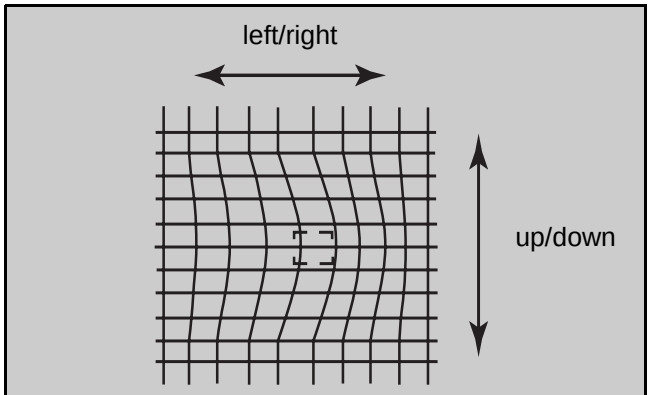


Figure 49. **POINT & ORIG. POINT adjustment**

18. Adjust to make lines as much straight as possible
19. When slightly adjustment is needed, use “ORIG. POINT” mode.
20. To enter to “G-ORIG. POINT” (for green) mode press TV/VIDEO.
21. With “ORIG. POINT”, the adjustment data changes by 1 step, this allows more detail in the adjustment. See values on screen by pressing RECALL on remote
22. Confirm that green adjustment is good enough, if adjustment is not satisfactory, repeat adjustments.
23. Enter to LINE “G-LINE” mode by pressing TV/VIDEO.
24. LINE mode allows to move each single line horizontally and vertically (See Figure 51).
25. Begin adjustment from the center to the edge of the screen (see Figure 50)
26. Adjust to make distribute lines

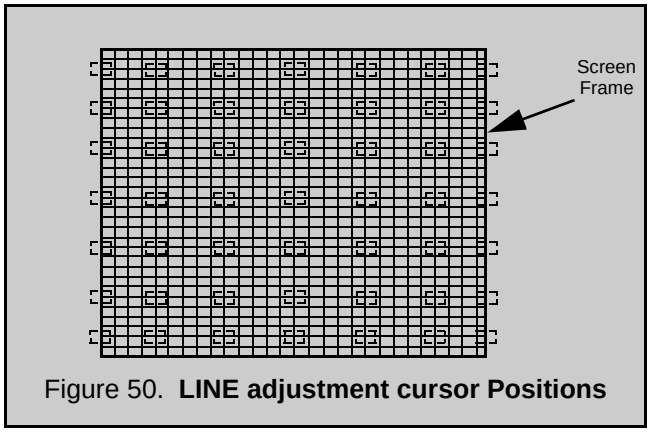


Figure 50. **LINE adjustment cursor Positions**

27. Then press “1 or 3” on the remote until red and green appears.

Note: *Since convergence adjustment will not allows to adjust every single cross section of the grid, it is very important to adjust, so that overall looks best.*

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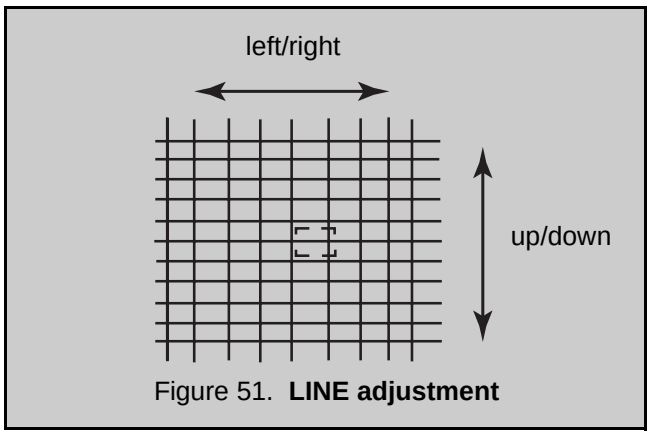


Figure 51. **LINE adjustment**

28. Perform adjustments for red so that red overlaps green, do not move green.
29. Press “1 or 3” on the remote until Yellow (Red and Green) and blue appears, do not move green or red.
30. Perform adjustments so that blue overlaps Yellow (Red and Green).
31. Press “1 or 3” key on remote to display red, green and blue (White).
32. At this point the crosshatch pattern should look white
33. If the crosshatch pattern is not only white, repeat adjustment for that color (Red or Blue)
34. Once the crosshatch pattern looks only white, perform the adjustments for White (“POINT”, “ORIG. POINT” & “LINE”), notice that each adjustment is only for white (Red,Green,Blue)
35. Adjust white for a good line distribution and make lines completely straight.
36. Press “7” key on remote, then ACTION to save changes.
37. Press POWER then ACTION to exit convergence adjustments (DACs menu appears).

Horizontal and Vertical Size Check

1. Apply monoscope pattern.

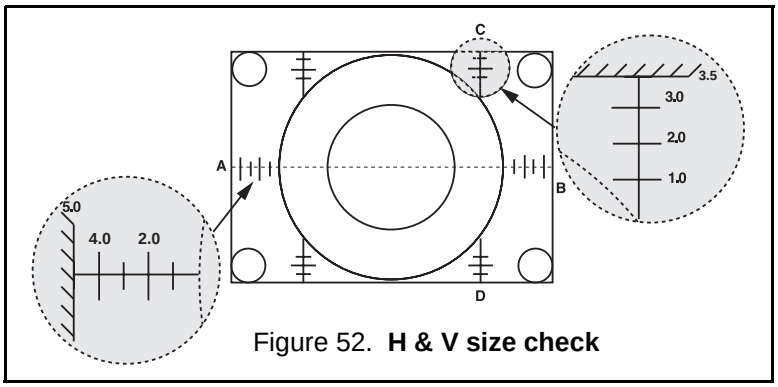


Figure 52. **H & V size check**

2. Confirm that horizontal size is 5 ± 0.2 lines at “A” and “B” and that vertical size is 3.5 ± 0.1 lines at “C” and “D” as indicated in Figure 52 with digital convergence dissabled (MUTE to 1); If digital convergence is enabled (MUTE to 0) vertical size is 4.0 ± 0.1 lines at “C”.

Convergence Alignment Template

The **Convergence Alignment Template** is a grid approximately the size of the viewing screen used to ensure the proper size and shape of the alignment rasters. It is 6 blocks across by 6 blocks high. The grid dimensions vary with the mode of operation.

Apply a **Convergence Alignment Template** to the viewing screen of the PTV. Make sure the center lines are properly aligned. If a template is not available, one can be created by following the instructions below.

Create a Convergence Alignment Template by drawing a pattern, as in Figure 53, in the actual dimensions on transparent film or tracing paper. Start with the Horizontal and Vertical Center Axis and work outwards until the pattern is complete. Pay attention to the actual dimensions of the pattern.

Grid Dimensions:

51” Models: 85.5mm Horizontal X 93mm Vertical.
56” Models: 1138mm Horizontal X 853mm Vertical.
61” Models: 1240mm Horizontal X 930mm Vertical.

Note: *A convergence alignment template, part number **TXFQD01ESER for 51” and TXFQD03ESER for 56” & 61”**, is available through Matsushita/Panasonic Services.*

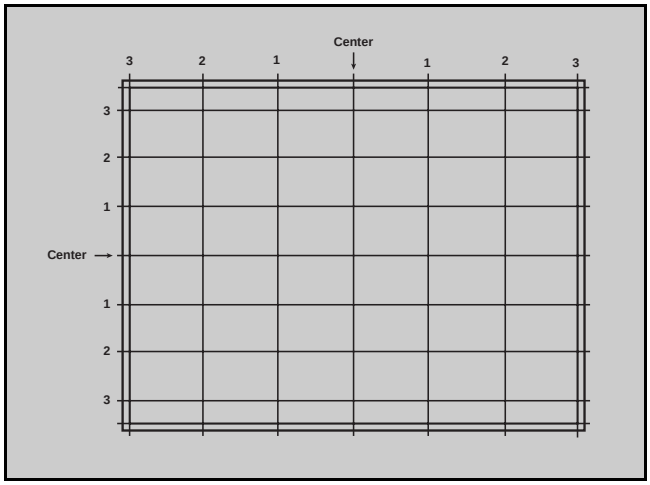


Figure 53. **Convergence adjustment grid**

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I²C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using "On Screen Display Menu". (The **Serviceman Adjustment Mode**.)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the* ***Serviceman Adjustment Mode****; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Quick Entry to Serviceman Mode:

When minor adjustments need to be done to the electronic controls, the method of Entering the serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press "ACTION" twice to exit menus.
4. Tune to the Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press VOL ◀ (decrease) **on Receiver**. Red "CHK" appears in upper corner.

Note: *After Receiver is set into SERVICEMAN mode, set TIMER back to NO.*

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing "ACTION" and "VOL" UP on the TV simultaneously will toggle between the modes. Red "CHK" for Serviceman and yellow "CHK" for Aging.

7. **Press Power** on the **Remote Control** to display the Serviceman Adjustment Modes menu, select adjustment by pressing the volume right/left buttons and channel up/down buttons on the remote and ACTION to enter the adjustment.

	480I	480P	1080I	
MODE	4:3	16:9	DW	
MTS	MTSIN	SEPAL	SEPAH	
CLOCK	CLOCK			
VIDEO	COLOR	B-Y_G	TINT	R-Y_A
	BRIGHT	CONT	CUT R	CUT B
	R DR	B DR	I-ABL	C_OFF
HDEF	H POS	H WID	PCC	EWCOR
	EWTRA	H CORR		
VDEF	VSIZE	VLIN	V-S	V-I
	VSYM	VCORR		
CONV	MUTE	COARSE	FINE	
DAF	H-PAR	V-SAW	V-PAR	
OTHER	ACL			

Figure 54. Serviceman Mode Menu Adjustments.

Note: *Some adjustments are available only in some modes (480i, 480p, 1080i); it is needed to apply the format; For some adjustments is required to perform adjustment for each format; Perform convergence adjustment for all formats (480i, 480p, 1080i "aspect 16:9 & 4:3"), a 480i, 480p, 1080i test pattern can be obtained from Panasonic* ***TU-DST51A (Set-top box)****.*

Exiting the Serviceman Mode:

Press **Action** and **Power** on the **Receiver** simultaneously for at least 2 seconds.

THE RECEIVER EXITS SERVICEMAN MODE.

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound. Any programmed channels, channels caption data and some others user defined settings will be erased.

IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.

To Check Purity:

Press **Recall** on the **Remote Control** when in Serviceman Mode (red "CHK" is displayed) to enter the Purity Field Check Mode.

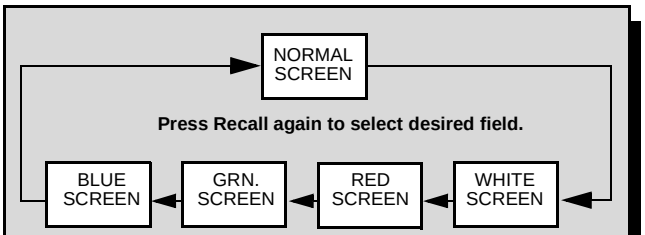


Figure 55. Purity Check Field Mode.

Service Mode (Electronic Controls, Continued)

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important Note:
Write down the original values ("b" in the adjustment mode details, Figure 54) for each address adjustment before modifying values.

Follow the procedure below to access the various Service adjustments. (Same procedures applies to each section.)

a. Press

CH ▲▼ buttons on the Remote Control to select any of the seven Service Sub Adjustment Addresses. ("a" in Figure 54)

b. Press

The ◀ ▶ buttons on the Remote Control to adjust the level of the selected Service Adjustments.

MTS Adjustments	Description	Default Level	New Level
MTSIN	INPUT LEVEL	1B	
SEPAL	LOW LEVEL SEPARATION	06	
SEPAH	HIGH LEVEL SEPARATION	1A	
CLOCK Adjustments	**Description**	**Default Level**	**New Level**
CLOCK	CLOCK	48	
VIDEO Adjustments	**Description**	**Default Level**	**New Level**
COLOR	COLOR	20	
TINT	TINT	23	
BRIGHT	SUB-BRIGHTNESS	42	
CONT	SUB-CONTRAST	10	
B-Y_G	MAGENTA TINT ADJ	0E	
R-Y_A	YELLOW TINT ADJ	04	
CUT R	RED CUT-OFF	00 FC	
CUT B	BLUE CUT-OFF	00 5D	
R DR	RED DRIVE	63	
B DR	BLUE DRIVE	9E	
I ABL	ABL	----	
C_OFF	COLOR ADJ. CUT-OFF	00	
HDEF Adjustments	**Description**	**Default Level**	**New Level**
H POS	HORIZONTAL POSITIONING	25	
H WID	HORIZONTAL WIDTH	1F	
PCC	PINCUSHION CORRECTION	30	
EWCOR	CORNER CORRECTION	07	
EWTRA	TRAPEZOID	08	
HCORR	HORIZONTAL CORRECTION	0F	
VER	VERSION	SELECT DEPENDING ON SERVICED PTV	

Note: *Registers marked as **FIXED** are factory preset, the default value must not be changed*

Important Note:

Write down the original values ("b" in the adjustment mode details, Figure 54) for each address adjustment before modifying values.

Follow the procedure below to access the various Service adjustments. (Same procedures applies to each section).

a. Press

CH ▲▼ buttons on the Remote Control to select any of the seven Service Sub Adjustment Addresses. ("a" in Figure 54)

b. Press

The ◄► buttons on the Remote Control to adjust the level of the selected Service Adjustments.

VDEF Adjustment	Description	Default Level	New Level
VSIZE	VERTICAL SIZE	7D	
VLIN	VERTICAL LINEARITY	12	
V-S	VERTICAL S CORRECTION	19 (DEFAULT)	
V-I	VERTICAL ENDING CORRECTION	0F (DEFAULT)	
VSYM	VERTICAL MAGNET CORRECTION	04 (DEFAULT)	
VCORR	VERTICAL CORRECTION	0C	
CONV Adjustments	**Description**	**Default Level**	**New Level**
MUTE	DIGITAL CONV (ON/OFF)	00	
COARS	COARSE ADJUSTMENT	ADJUSTMENT	
FINE	FINE ADJUSTMENT	ADJUSTMENT	
DAF Adjustments	**Description**	**Default Level**	**New Level**
H-PAR	HORIZONTAL PARABOLA	+263	
V-SAW	VERTICAL SAW	-35	
V-PAR	VERTICAL PARABOLA	+117	
OTHER Adjustments	**Description**	**Default Level**	**New Level**
ACL	-------	00 (DEFAULT)	
HHS	-------	00 (DEFAULT)	

Important Notice:

In **HDEF** Adjustments, "**VER**" option is set to 4:3 or 16:9 depending on the PTV model, if sevicing a widescreen PTV light-box, **VER** should be set to 16:9, for non-widescreen PTV use 4:3.
To change the format in **VER**, select either 16:9 or 4:3 (depending on the PTV), then unplug PTV and plug it back, the PTV will be restore in the selected format.
Be sure to select the correct format for the serviced PTV.

Instructional Flow Chart for Serviceman Mode

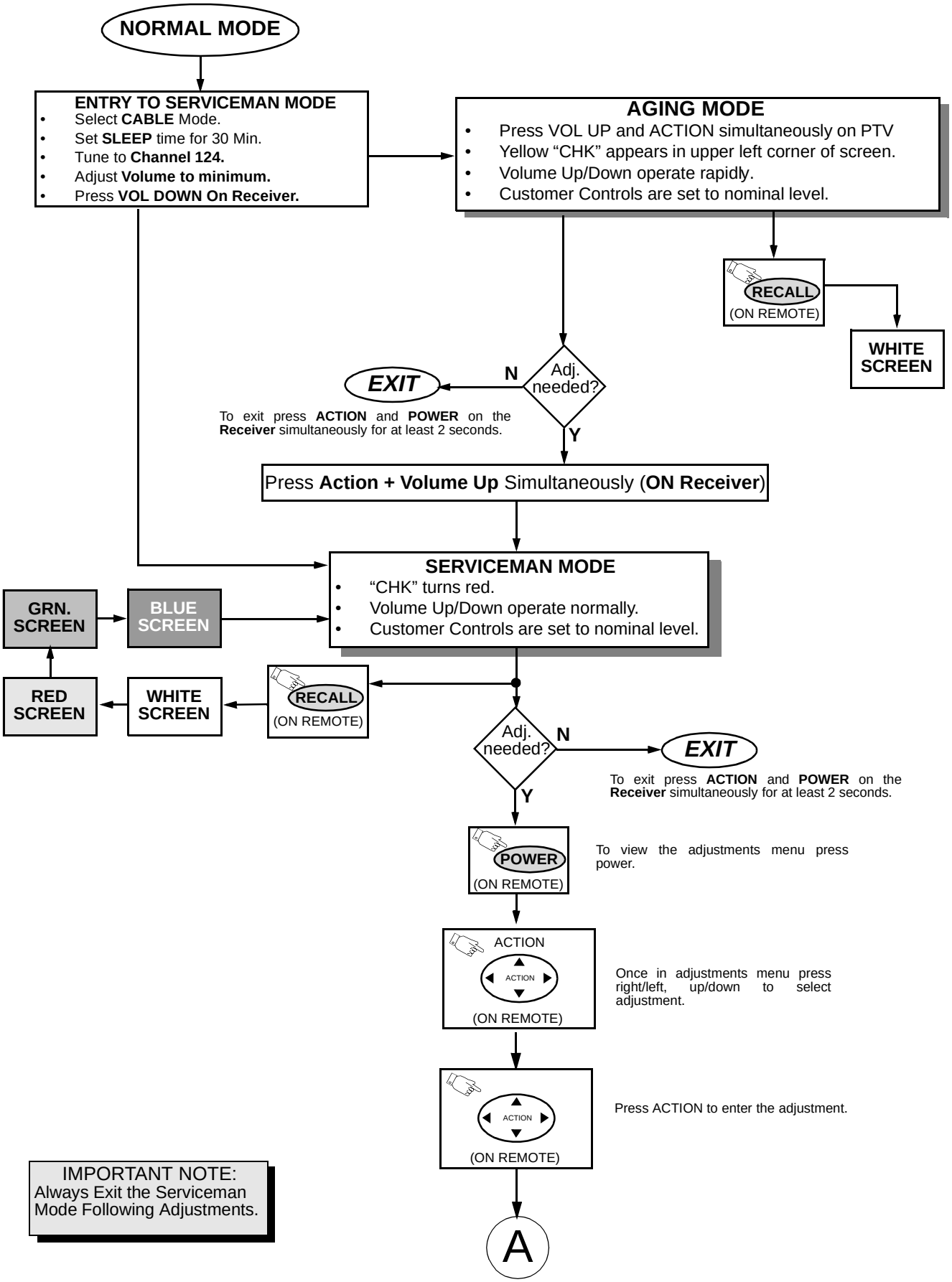
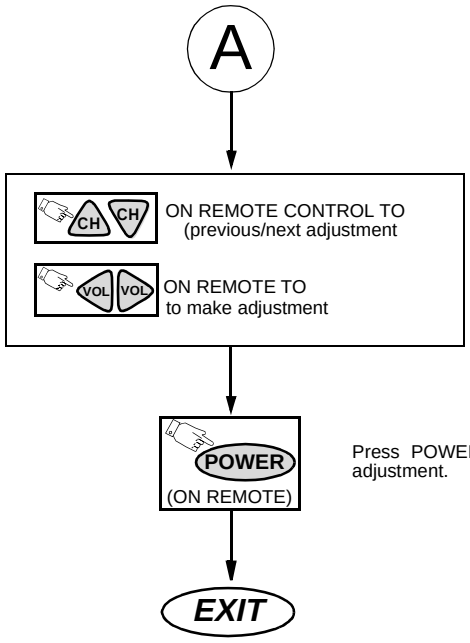

NORMAL MODE
ENTRY TO SERVICEMAN MODE
• Select CABLE Mode.
• Set SLEEP time for 30 Min.
• Tune to Channel 124.
• Adjust Volume to minimum.
• Press VOL DOWN On Receiver.
AGING MODE
• Press VOL UP and ACTION simultaneously on PTV
• Yellow "CHK" appears in upper left corner of screen.
• Volume Up/Down operate rapidly.
• Customer Controls are set to nominal level.
RECALL
(ON REMOTE)
WHITE SCREEN
Adj. needed?
N
EXIT
To exit press ACTION and POWER on the Receiver simultaneously for at least 2 seconds.
Y
Press Action + Volume Up Simultaneously (ON Receiver)
SERVICEMAN MODE
• "CHK" turns red.
• Volume Up/Down operate normally.
• Customer Controls are set to nominal level.
GRN. SCREEN
BLUE SCREEN
RED SCREEN
WHITE SCREEN
RECALL
(ON REMOTE)
Adj. needed?
N
EXIT
To exit press ACTION and POWER on the Receiver simultaneously for at least 2 seconds.
Y
POWER
(ON REMOTE)
To view the adjustments menu press power.
ACTION
(ON REMOTE)
Once in adjustments menu press right/left, up/down to select adjustment.
(ON REMOTE)
Press ACTION to enter the adjustment.
IMPORTANT NOTE:
Always Exit the Serviceman Mode Following Adjustments.
A

Figure 56.**Flow Chart for Serviceman Mode**.

Instructional Flow Chart for Serviceman Mode - Continued



Press POWER to exit DACs MENU then press **ACTION** and **POWER** on the **PTV** simultaneously for at least 2 seconds to exit service mode.

Flow Chart for Serviceman Mode (Continued).

HV_Feedback Voltage

Procedure:

1. Apply a NTSC all black pattern.
2. Connect meter (+) to TPD33 and (-) to TPGND1
3. Adjust R524 (D-Board) so that reading on meter is 5.0±0.2_V.

Bright Adjustment (BRIGHT)

Procedure:

1. Set to normal PICTURE settings, NATURAL COLOR to OFF and COLOR TEMPERATURE to NORMAL.
2. Connect meter (+) to TPD50 and (-) to TPD51.
3. Apply a Black/White pattern.
4. Adjust DAC BRIGHT data so that 7.5 IRE part is same light output as 3 IRE part (See Figure 57).
5. Apply a monoscope pattern and put user bright control to max. and confirm reading on meter is 16.5±1_V.

Sub-Contrast (CONT), Sub-Bright (BRIGHT) Adjustment

Preparation:

1. Set Auto Color and AI Picture to OFF
2. Set the following in the user picture menu as follows:
   COLOR: min. (0)
   PICTURE: max (63)
   BRIGHT: center (31)
   SHARPNESS: min. (0)

Procedure:

1. Apply a Black levels Pattern (See Figure 57)

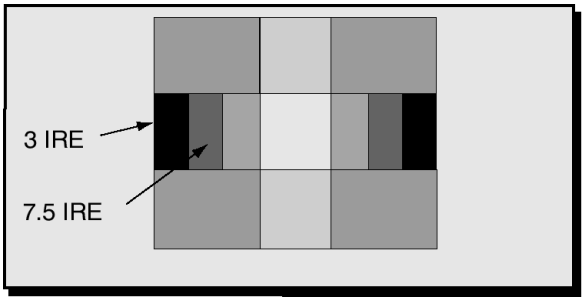


Figure 57. **Black Levels Pattern**

2. Adjust DAC BRIGHT (final adjustment) so that 7.5 IRE part just look like 3 IRE part.
3. Apply a Black/White pattern (See Figure 58)

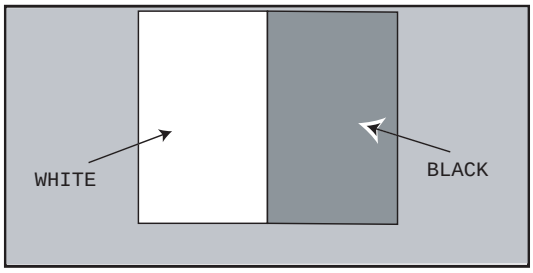


Figure 58. **Black/White Pattern**

4. Adjust DAC CONT so that black and white level are in good balance (white is white and black is black)

Tint Adjustment (TINT)

This adjustment should be performed

Preparation:

5. Set the following in the user picture menu as follows:
   COLOR: center (31)
   PICTURE: max (63)
   BRIGHT: center (31)
   SHARPNESS: min. (0)

Procedure:

1. Apply a Black levels Pattern (See Figure 59)

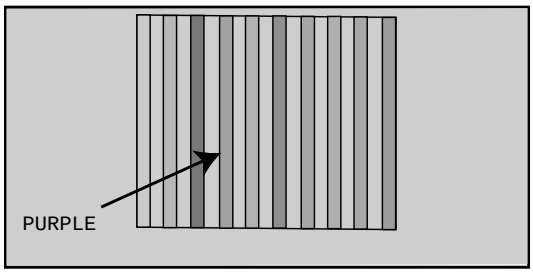


Figure 59. **Rainbow Pattern**

2. Adjust DAC TINT so that the fourth bar from left becomes purple and good color balance.

Service Mode (Electronic Controls, Continued)

Red, Green & Blue Screen Cutoff

1. Use either a no input signal condition or raster from the NTSC generator.
2. Observing the green tube directly or via a reflective surface, adjust the VR on focus pack for the green tube for minimum noise.
3. Adjust the noise level in the red and blue tubes to match the noise level in the green tube.

White Balance Adjustment

Prior to this adjustment, perform Contrast adjustment. This adjustment requires that the service use skills in observing what a screen without color should look like (White Picture).

1. Enter the service mode.
2. Apply a black and white pattern to one of the video inputs.

High Light White Balance Adjustment

1. Adjust DAC R_DR for Red and B_DR for Blue adjustments.
2. Make sure the screen is not blue or Green. The screen should be white in all areas.
3. Check the black and white pattern for a black and white picture with even shades of gray and no color tint in the picture.

Low Light White Balance Adjustment

1. Adjust DAC CUT_R for Red and DAC CUT_B for Blue.
2. Check the screen for even white in all areas, no color.
3. Check the black and white pattern for a black and white picture, even shades of gray and no color tint in the low light areas.
4. Repeat the High Light and Low Light White Balance again until the white balance tracks from high light to low light.

Tint and Color Check

Again, the service ability to see color and the balance of color is important for theses adjustments.

Tint Check

1. In Picture Menu set Picture Norm to YES.
2. Apply color bars to the video input.
3. Magenta is composed of two colors, blue and red.
4. Check to see that magenta does not have too much blue or too much red.
5. Check cyan. Cyan is composed of blue and green. It should not have too much blue or green.
6. Use a test signal from a VCR or laser disk that has a pre-recorded close up of a signal that has good flesh tones.
7. The signal on the VCR or laser disk should look normal.

Color Check

Using a clean RF or video signal, set the color level so that it does not saturate or appear harsh. Make sure that color is not set so that it appears dull and washed out. Look for natural colors, try to adjust the picture to appear as a normal photograph.

MTS Circuit Adjustments

Note: *It is important to adjust the MTS circuit in the order shown below.*

The MTS Circuit Adjustments require two steps:

1. Input Level Adjustment.
2. Stereo Separation Adjustment.

Input Level Adjustment (MTSIN)

Preparation:

1. Connect an RMS meter (AC Range) with filter jig as shown in Figur e60.

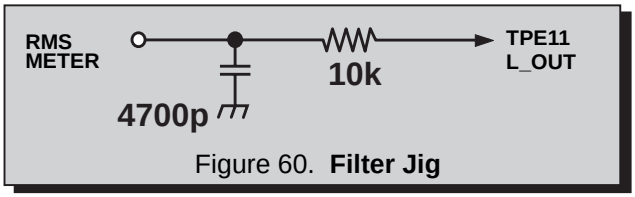


Figure 60. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:

1. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 100% modulation, monaural (70 ± 5dB, 75Ω OPEN, P/S 10dB). Make sure to turn off 75μs pre-emphasis.
2. Adjust (MTSIN) *MTS-INPUT* data until the voltage measured is 106mV ± 6.0mV rms.

Stereo Separation Adjustment (SEPAL & SEPAH)

Preparation:

1. Connect an RF signal generator to the RF antenna input.
2. Connect an oscilloscope probe to TPE10 (R_out).

Procedure:

1. Set PTV to Stereo Mode (in the Audio Menu).
2. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.
   Audio: 300Hz, 30% modulation, stereo (left only) (70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: *Set the 30% modulation with the pilot light SW and N.R. switches OFF then turn them ON while testing.*

---

3. Adjust MTS Low-Level Separation (SEPAL) data (in the Service Adjustment Menu) until the amplitude of the measured waveform on the scope is minimum.
4. Apply the following signal from the RF signal generator:
   Video: 100 IRE flat field, 30% modulation.Audio: 3KHz, 30% modulation, stereo (left only).
   (70dB ± 5dB, 75Ω OPEN, P/S 10dB).

Note: *Set the 30% modulation with theP.L and N.R. switches OFF then turn them ON while testing.*

5. Adjust MTS High-Level Separation (SEPAH) data until the amplitude of the waveform measured on the scope is minimum.
6. Repeat above steps 3 through 4 until the amplitude is at minimum for both signals.

Clock Adjustment (CLOCK)

Preparation:

Connect the frequency counter from IC001 MPU Pin 10 or TPA009, to cold ground ( ).

Note: *Frequency Counter probe capacitance should be 8pF or less.*

Procedure:

1. Turn the PTV "ON" with the AC power applied.
2. Measure TPA009 IC001 MPU pin 10 for frequency and record the reading.

Note: *Pin 10 measurement must have at least four digits of resolution following the decimal point. Example: 000.0000*

3. Place the PTV into Service Mode for making electronic adjustment, select the Clock Adjustment DAC CLOCK and change value to 128.
4. Calculate and set CLOCK based on the following formula:

$$CLOCK = 128 + 0.450x106x\frac{\{732.4220 - pin(10)[\mathrm{Hz}]\}}{732.4220}$$

Note: *Pin 10 measurement will not change regardless of the value stored in CLOCK.*

Audio Signal Path Block Diagram

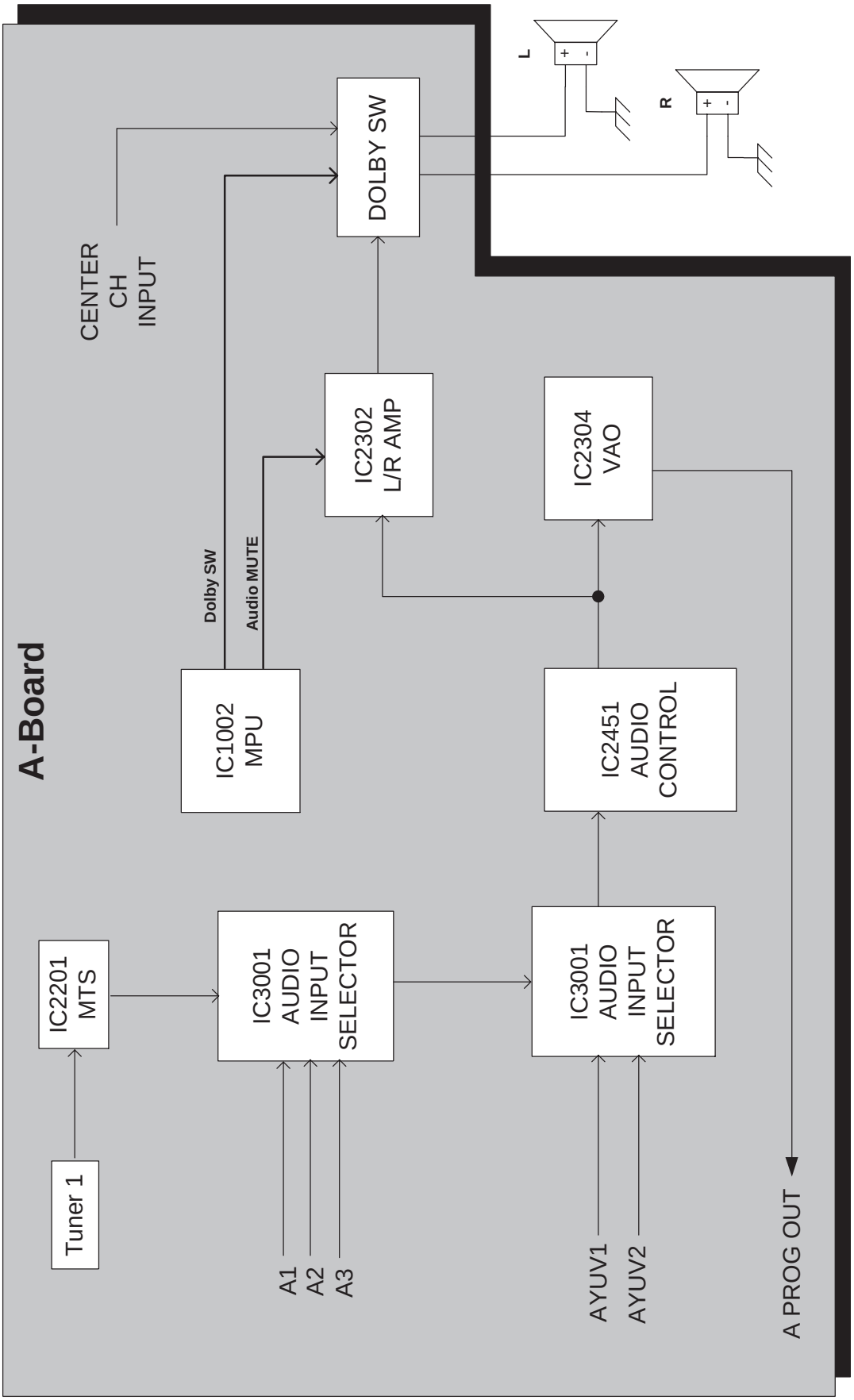


Figure 61. **Audio Signal Path Block Diagram**

Video-Chroma Signal Path Block Diagram

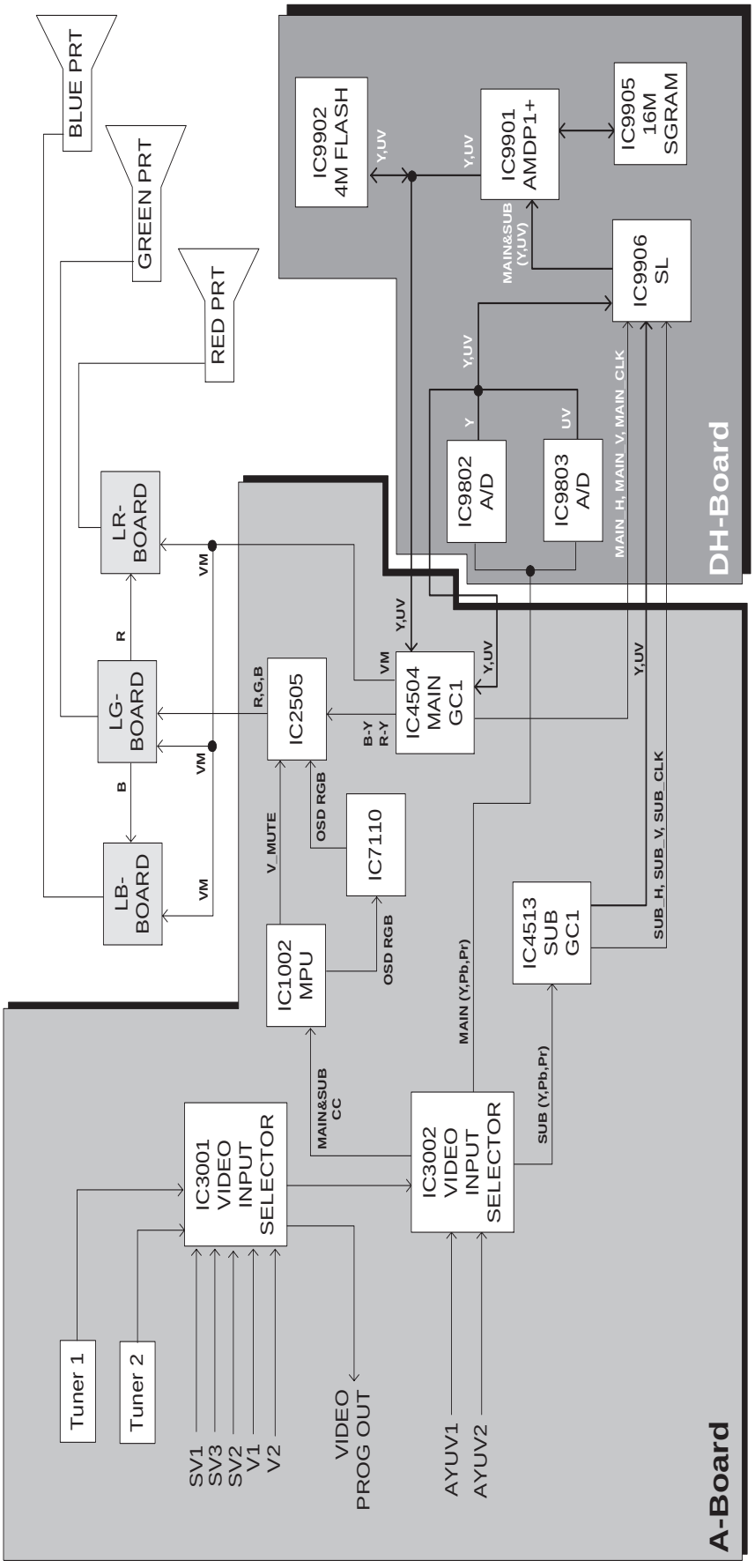


Figure 62. **Video-Chroma Signal Path Block Diagram**.

IIC Connection

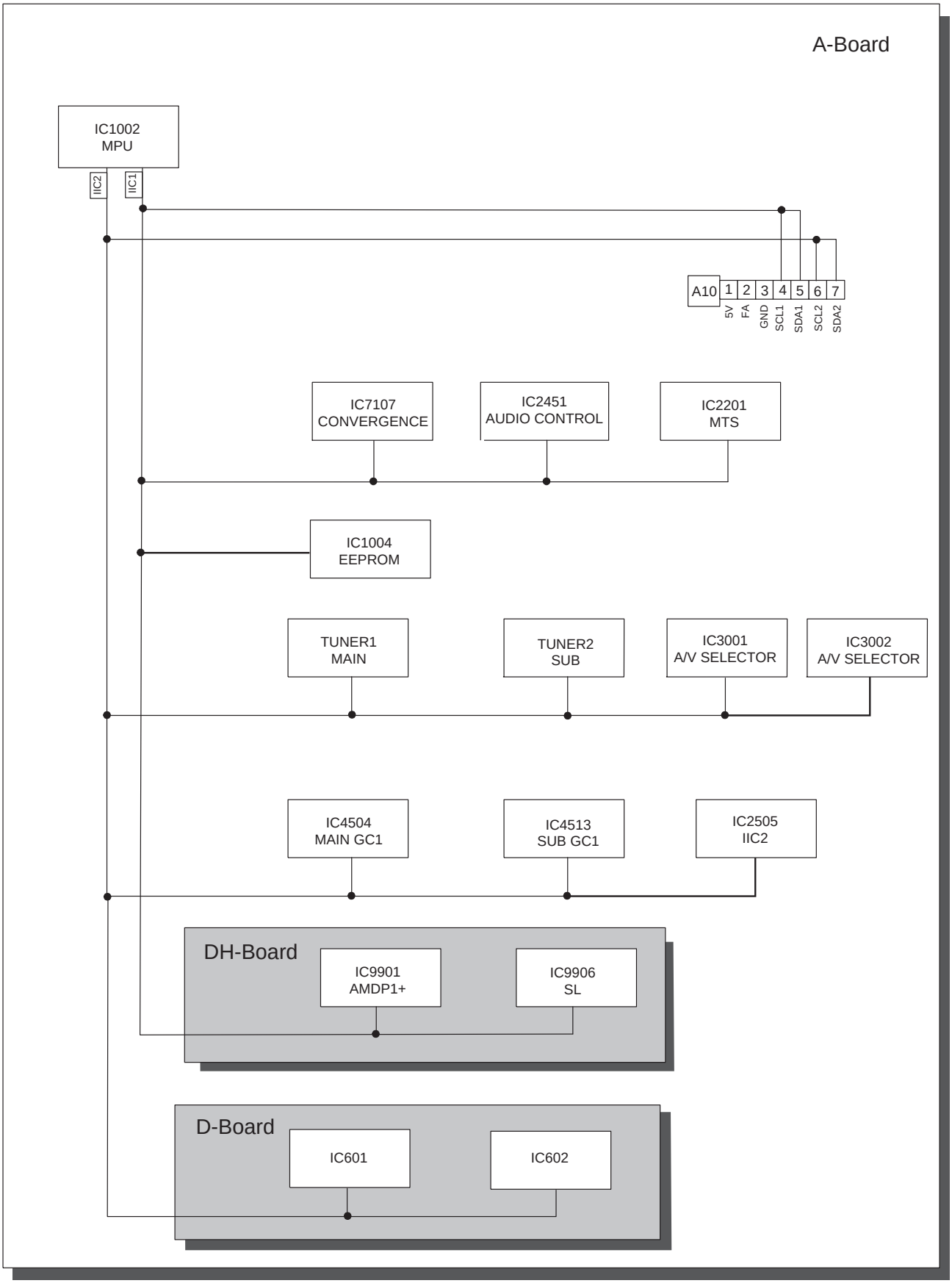


Figure 63. **IIC Connection**

Description of Connectors

LG2---D5	
1	210V
2	NC
3	GND
4	GND
5	+20V
6	+12V
7	HEATER
8	GND
9	NC
10	140V

LG1---A15	
1	GND
2	B
3	GND
4	R
5	GND
6	G
7	GND
8	GND
9	VM
10	GND
11	S-ABL
12	+12V

LG3---LR1	
1	210V
2	NC
3	HEATER 6.3V
4	OFF MUTE
5	GND
6	R
7	12V
8	GND
9	S-ABL
10	20V
11	GND
12	VM
13	NC
14	140V

LG4---LB1	
1	210V
2	NC
3	HEATER 6.3V
4	OFF MUTE
5	GND
6	B
7	12V
8	GND
9	S-ABL
10	GND
11	VM
12	NC
13	140V

A12---CY_G	
1	GH-R
2	GH
3	GV
4	GV-R

A11---CY_R	
1	RH-R
2	RH
3	RV
4	RV-R

A13---CY_B	
1	BH_R
2	BH
3	BV
4	BV-R

A10---BUSSCON	
1	5V
2	FA
3	GND
4	SCL1
5	SDA1
6	SCL2
7	SDA2

A8---K1	
1	GND
2	KEY_SCAN1
3	KEY_SCAN2
4	TP
5	GND
6	LED_5V

A51---R	
1	STB 3.3V
2	RM_IN
3	GND

A1---D1	
1	+18V
2	GND
3	+18V
4	GND
5	-18V
6	GND
7	-18V
8	C_BTL 40V
9	AC ON/OFF
10	P_BTL 40V
11	GND
12	STBY 7V
13	NC
14	NC
15	GND
16	GND

A2---D2	
1	GND
2	20V
3	GND
4	20V
5	GND
6	20V
7	GND
8	20V
9	GND
10	GND
11	GND
12	GND
13	ABL
14	GND
15	SOS
16	GND

Description of Connectors (continued)

A3---D3	
1	BLK
2	9V
3	SDA
4	GND
5	SCL
6	GND
7	GND
8	GND
9	VP3
10	GND
11	V-PULSE
12	GND
13	GND
14	GND
15	H-PULSE
16	SET +5V

A6---G1	
1	Y/V
2	NC
3	GND
4	C
5	S
6	L
7	GND
8	R
9	GND

A4---D4	
1	HHS DET
2	GND
3	+18V
4	GND
5	+18V
6	GND
7	GND
8	GND
9	-18V
10	GND
11	-18V
12	GND
13	GND
14	DAF
15	GND
16	DFCUT

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
	CAPACITORS	
C051	EEUFC1E470B	CAP,E 47UF-25V
C052	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C301	ECA2EM100B	CAP,E 10UF/250V
C304	ECKW2H103PU8	CAP,C .01UF-P-500V
C305	ECA1HM470B	CAP,E 47UF-50V
C306	ECA2EM100E	CAP,E 10UF-250V
C307	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C308	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C309	ECQB1H104KF3	CAP,P .10UF-J-50V
C310	ECA1HM220B	CAP,E 22UF-50V
C312	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C313	ECKR2H102KB5	CAP,C 1000PF-K-500V
C331	ECA1HM470B	CAP,E 47UF-50V
C332	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C333	ECA1HM470B	CAP,E 47UF-50V
C334	ECA2EM470B	CAP,E 47UF-250V
C336	ECA1HM470B	CAP,E 47UF-50V
C337	ECA2EM470B	CAP,E 47UF-250V
C338	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C339	ECKW2H103PU8	CAP,C .01UF-P-500V
C340	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C341	ECA2EM100E	CAP,E 10UF-250V
C342	ECA1HM220B	CAP,E 22UF-50V
C343	ECQB1H104KF3	CAP,P .10UF-J-50V
C345	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C346	ECKR2H102KB5	CAP,C 1000PF-K-500V
C361	ECA1CM101B	CAP,E 100UF/16V
C364	ECKW2H103PU8	CAP,C .01UF-P-500V
C365	ECA2EM100E	CAP,E 10UF-250V
C366	ECA1HM470B	CAP,E 47UF-50V
C367	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C368	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C369	ECA1HM220B	CAP,E 22UF-50V
C370	ECQB1H104KF3	CAP,P .10UF-J-50V
C372	ECKC3D102KBN	CAP,C 1000PF-K-2KV
C373	ECKR2H102KB5	CAP,C 1000PF-K-500V
C374	ECA1CM101B	CAP,E 100UF/16V
C405	ECA1EM102B	CAP,E 1000UF-25V
C406	ECA1EM102B	CAP,E 1000UF-25V
C407	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C408	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C411	TCJ2VB1H822K	CAP,C .0082UF-K-50V
C412	ECQB1224KF3	CAP,P .22UF-K-100V
C413	ECA1HM010B	CAP,E 1UF-50V
C414	TCJ2VB1H272K	CAP,C .0027UF-K-50V
C417	TCJ2VB1H103K	CAP,C .01UF-K-50V
C418	ECQB1H183JM3	CAP,P .018UF-J-50V
C421	ECEA1CN220UB	CAP,E 22UF-16V
C461	ECA1HM221B	CAP,E 220UF-50V
C501	ECA1VM101B	CAP,E 100UF-35V

REF NO.	PART NO.	DESCRIPTION
C502	ECQV1H105JL3	CAP,P 1.0UF-J-50V
C503	ECKR2H102KB5	CAP,C 1000PF-K-500V
C509	ECWF2474JSR	CAP,P .47UF-J-200V
C511	**ECWH20222JVY**	**CAP,P 2200PF-J-2KV**
C512	**ECWH20102JVY**	**CAP,P 1000PF-J-2KV**
C513	**ECQF4103JZH**	**CAP,P .01UF-J-400V**
C514	**ECWH20222JVY**	**CAP,P 2200PF-J-2KV**
C518	**ECKW3D221JBP**	**CAP,C 220PF-J-2KVDC**
C519	**ECKW3D221JBP**	**CAP,C 220PF-J-2KVDC**
C520	**ECQB1H103JM3**	**CAP,P .01UF-J-50V**
C522	**ECWH20182JVY**	**CAP,P 1800PF-J-2KV**
C523	**ECWH20182JVY**	**CAP,P 1800PF-J-2KV**
C524	ECQB1224JF3	CAP,P .22UF-J-100V
C525	ECEA1HN220UB	CAP,E 22UF/50V
C526	ECA2EM101B	CAP,E 100UF-250V
C527	ECKR2H102KB5	CAP,C 1000PF-K-500V
C528	**ECA1HM470B**	**CAP,E 47UF-50V**
C531	ECA160V33UE	CAP,E 33UF/160V
C532	ECQB1H103JM3	CAP,P .01UF-J-50V
C533	ECKR2H101KB5	CAP,C 100UF-K-500V
C535	ECA1HM471B	CAP,E 470UF-50V
C601	EEUFC1C331B	CAP,E 330UF-16V
C602	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C603	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C605	ECA1HM010B	CAP,E 1UF-50V
C606	ECA1HM010B	CAP,E 1UF-50V
C608	ECQB1H103JM3	CAP,P .01UF-J-50V
C609	TCJ2VC1H820J	CAP,C 82PF-J-50V
C610	ECQB1H473JM3	CAP,P .047UF-J-50V
C611	ECQV1H105JL3	CAP,P 1.0UF-J-50V
C613	ECA1CM221B	CAP,E 220UF-16V
C614	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C616	ECQB1H104JM3	CAP,P .1UF-J-50V
C617	ECA1CM221B	CAP,E 220UF-16V
C618	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C619	ECJ2VC1H272J	CAP,C .0027UF-J-50V
C620	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C621	ECQB1H681JF3	CAP,P 680PF-J-50V
C622	TCJ2VC1H221J	CAP,C 220PF-J-50V
C623	ECQB1H473JF3	CAP,P .047UF-J-50V
C624	TCJ2VB1H152K	CAP,C .0015UF-K-50V
C625	TCJ2VC1H820J	CAP,C 82PF-J-50V
C627	ECQB1H183JM3	CAP,P .018UF-J-50V
C629	ECQV1H474JL3	CAP,P .47UF-J-50V
C631	ECSF1EE225VB	CAP,E 2.2UF-25V
C632	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C701	ECA1CM221B	CAP,E 220UF-16V
C702	ECKR3D271KBP	CAP,C 270PF-K-2KV
C703	ECQM2104KZW	CAP,P .1UF-K-200V
C704	ECKR2H391KB5	CAP,C 390PF-K-500V
C705	ECKR2H561KB5	CAP,C 560PF-K-500V

REPLACEMENT PARTS LIST

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REF NO.	PART NO.	DESCRIPTION
C707	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C708	ECQE1685KFB	CAP,P 6.8UF-K-100V
C801	**ECQU2A104MNB**	**CAP,P .10UF-M-250VAC**
C802	**ECQU2A823MNB**	**CAP,P .082UF-M-250VAC**
C803	**ECKCNA222ME7**	**CAP,C 2200PF-M-125V**
C804	**ECKCNA222ME7**	**CAP,C 2200PF-M-125V**
C805	**ECKR2H472PU7**	**CAP,C 4700PF-P-500V**
C806	**ECKR2H472PU7**	**CAP,C 4700PF-P-500V**
C807	**ECKR2H472PU7**	**CAP,C 4700PF-P-500V**
C808	ECA1VM101B	CAP,E 100UF-35V
C809	TCJ2VB1E223K	CAP,C .022UF-K-25V
C810	**EETED2D102C**	**CAP,E 1000PF-200V**
C812	ECA1EHG471B	CAP,E 470UF-25V
C814	ECKW3D102KBP	CAP,C 1000PF-K-2KV
C815	ECQB1H152JF3	CAP,P 1500PF-J-50V
C816	ECKW3D821KBP	CAP,C 820PF-K-2KV
C817	ECKW3D102KBP	CAP,C 1000PF-K-2KV
C819	ECQB1H102JM3	CAP,P 1000PF-J-50V
C820	ECQV1H334JL3	CAP,P .33UF-J-50V
C821	ECQB1H272KF3	CAP,P 2700PF-K-50V
C822	ECA1HM220B	CAP,E 22UF-50V
C823	TCJ2VC1H151J	CAP,C 150PF-J-50V
C824	EEUFC1V151B	CAP,E 150UF-35V
C825	**ECKCNA102MBB**	**CAP,C .001UF-M-125V**
C826	TCJ2VB1E104K	CAP,C .10UF-K-25V
C830	**EETHC2C471B**	**CAP,E 470PF-160V**
C831	ECKR3D821KBP	CAP,C 820PF-K-2KV
C832	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C834	EEUFC1V222E	CAP,E 2200UF-35V
C836	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C837	ECA1EM472E	CAP,E 4700UF-25V
C838	ECA1EM471B	CAP,E 470UF-25V
C839	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C840	ECA1EM471B	CAP,E 470UF-25V
C841	ECA1EM472E	CAP,E 4700UF-25V
C842	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C843	ECA1VM222E	CAP,E 2200UF-35V
C844	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C845	ECA1VM222E	CAP,E 2200UF-35V
C846	ECKR3A331KBP	CAP,C 330PF-K-1KVDC
C848	ECA1CM101B	CAP,E 100UF/16V
C849	ECKR1H223ZF5	CAP,C .022UF-Z-50V
C851	ECQV1H104JL3	CAP,P .10UF-J-50V
C852	ECA1VM101B	CAP,E 100UF-35V
C854	ECA1CM221B	CAP,E 220UF-16V
C855	TCJ2VB1E104K	CAP,C .10UF-K-25V
C883	ECQV1H474JL3	CAP,P .47UF-J-50V
C890	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C897	ECQV1H474JL3	CAP,P .47UF-J-50V
C898	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C902	ECQM2103KZ3	CAP,P .01UF-K-200V

REF NO.	PART NO.	DESCRIPTION
C903	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C904	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C906	ECQM2103KZ3	CAP,P .01UF-K-200V
C907	ECA2CM100E	CAP,E 10UF-160V
C908	ECA1CM101B	CAP,E 100UF/16V
C909	ECA1CM101B	CAP,E 100UF/16V
C910	ECA2CM100E	CAP,E 10UF-160V
C939	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C940	ECQM2103KZ3	CAP,P .01UF-K-200V
C941	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C942	ECQM2103KZ3	CAP,P .01UF-K-200V
C943	ECA2CM100E	CAP,E 10UF-160V
C944	ECA1CM101B	CAP,E 100UF/16V
C945	ECA1CM101B	CAP,E 100UF/16V
C947	ECA2CM100E	CAP,E 10UF-160V
C962	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C963	ECQM2103KZ3	CAP,P .01UF-K-200V
C965	ECKR1H103ZF5	CAP,C .01UF-Z-50V
C966	ECQM2103KZ3	CAP,P .01UF-K-200V
C967	ECA2CM100E	CAP,E 10UF-160V
C968	ECA1CM101B	CAP,E 100UF/16V
C969	ECA1CM101B	CAP,E 100UF/16V
C970	ECA2CM100E	CAP,E 10UF-160V
C1502	ECQE6104KFB	CAP,P 100UF-K-100V
C1503	ECQE6104KFB	CAP,P 100UF-K-100V
C1504	ECQB1H103JM3	CAP,P .01UF-J-50V
C1505	ECA1CM221B	CAP,E 220UF-16V
C1506	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C1508	ECQB1H223JF3	CAP,P .022UF-J-50V
C1510	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C1511	TCJ2VC1H471J	CAP,C 470PF-J-50V
C1512	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C1513	ECEA1EN101UB	CAP,E 100UF-25V
C1514	ECA1CM101B	CAP,E 100UF/16V
		DIODES
D081	LN21RCPHL	DIODE, LED
D082	MA4056MTA	DIODE
D083	MA4056MTA	DIODE
D301	MA167TA5	DIODE
D302	MA4150HTA	DIODE
D303	TVSRM1V1	DIODE
D304	MA165TA5VT	DIODE, SWITCHING
D305	MA165TA5VT	DIODE, SWITCHING
D306	MA165TA5VT	DIODE, SWITCHING
D307	MA165TA5VT	DIODE, SWITCHING
D310	MA165TA5VT	DIODE, SWITCHING
D311	MA165TA5VT	DIODE, SWITCHING
D312	MA188TA5	DIODE
D313	MA188TA5	DIODE
D314	MA188TA5	DIODE
D315	MA188TA5	DIODE

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
D331	MA165TA5VT	DIODE, SWITCHING
D332	MA165TA5VT	DIODE, SWITCHING
D333	MA165TA5VT	DIODE, SWITCHING
D334	MA165TA5VT	DIODE, SWITCHING
D335	MA165TA5VT	DIODE, SWITCHING
D338	MA165TA5VT	DIODE, SWITCHING
D339	MA188TA5	DIODE
D340	MA188TA5	DIODE
D341	MA188TA5	DIODE
D342	MA188TA5	DIODE
D361	MA165TA5VT	DIODE, SWITCHING
D362	MA165TA5VT	DIODE, SWITCHING
D363	MA165TA5VT	DIODE, SWITCHING
D364	MA165TA5VT	DIODE, SWITCHING
D366	MA165TA5VT	DIODE, SWITCHING
D368	MA165TA5VT	DIODE, SWITCHING
D369	MA188TA5	DIODE
D370	MA188TA5	DIODE
D371	MA188TA5	DIODE
D372	MA188TA5	DIODE
D407	MA152KTX	DIODE
D409	MA165TA5VT	DIODE, SWITCHING
D410	MA152KTX	DIODE
D411	MA165TA5VT	DIODE, SWITCHING
D451	AM01ZV0	DIODE
D452	AM01ZV0	DIODE
D453	AM01ZV0	DIODE
D454	AM01ZV0	DIODE
D455	AM01ZV0	DIODE
D456	AM01ZV0	DIODE
D458	ERA15-01V3	DIODE, RECTIFIER
D501	D1NL40V70	DIODE
D502	MA4150MTA	DIODE
D503	FMV-3GULF730	DIODE
D504	MA4270MTA	DIODE
D509	MA165TA5VT	DIODE, SWITCHING
D510	MA4068LTA	DIODE
D511	ERA18-04V3	DIODE
D512	**D1NL40V70**	**DIODE**
D513	MA165TA5VT	DIODE, SWITCHING
D515	D1NL40V70	DIODE
D516	EU2YXV0	DIODE
D519	AU02ZV0	DIODE
D634	MA165TA5VT	DIODE, SWITCHING
D650	MA4110MTA	DIODE, ZENER
D651	MA4110MTA	DIODE, ZENER
D656	MA4110MTA	DIODE, ZENER
D657	MA4110MTA	DIODE, ZENER
D659	MA4110MTA	DIODE, ZENER
D660	MA4110MTA	DIODE, ZENER
D662	MA4110MTA	DIODE, ZENER

REF NO.	PART NO.	DESCRIPTION
D663	MA4110MTA	DIODE, ZENER
D702	D1NL40V70	DIODE
D801	**RBV-408**	**BRIDGE, RECTIFIER**
D802	**ERZC10VK361G**	**VARISTOR**
D815	MA165TA5VT	DIODE, SWITCHING
D816	MA700TA	DIODE
D817	AU01ZV0	DIODE
D818	MA3270LTX	DIODE
D819	**TMPG10G3**	**DIODE**
D822	ERA22-02V3	DIODE
D825	**FMLG16SLF116**	**DIODE**
D827	RL4ZLF-J6	DIODE
D828	B0HBRM000012	DIODE
D829	B0HBRM000012	DIODE
D830	RL4ZLF-J6	DIODE
D831	RL4ZLF-J6	DIODE
D835	TVSA81004V3	DIODE
D837	MA152KTX	DIODE
D895	MA165TA5VT	DIODE, SWITCHING
D902	MA188TA5	DIODE
D933	MA188TA5	DIODE
D953	TVSSR2KNV	DIODE, ZENER
D962	MA188TA5	DIODE
D973	TVSSR2KNV	DIODE, ZENER
D983	TVSSR2KNV	DIODE, ZENER
D1502	RP1H	DIODE
D1503	**MA4030HTA**	**DIODE**
D1504	RP1H	DIODE
D1505	MA29-BTA	DIODE
D1506	**MA4051HTA**	**DIODE**
D1599	MA152KTX	DIODE
	FUSES	
F801	XBA1C63NU100	FUSE 6.3A/125V
	INTEGRATED CIRCUITS	
IC451	LA78045	VERTICAL OUT
IC601	C0ZAZ0000091	HORIZONTAL OUT
IC602	TA8859AP	V SAW
IC603	BA15218F-E2	INT CKT
IC701	AN6914	INT CKT
IC801	**AN8029**	**MAIN REG**
IC802	**SE139NLF4**	**ERROR AMP**
IC803	AN78L12TA	INT CKT
IC804	TVSS1WBS20	BRIDGE RECTIFIER
IC805	AN78M09-LB	INT CKT
IC811	**0N3171RLF**	**INT CKT**
IC870	SI-8033S	INT CKT
IC880	AN78N12-LB	INT CKT
IC1501	AN6562S-E1	INT CKT
IC2302	TDA7490	AUDIO AMP L/R
IC7001	STK392-110	INT CKT
IC7002	STK392-110	INT CKT

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

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REF NO.	PART NO.	DESCRIPTION
IC7104	CD0031AMT	INT CKT PT-51HX41E/CE
RM002	PNA4701M05TV	INT CKT
		COILS
L301	ELEBD101KA	COIL, PEAKING 100UH
L302	ELESN100JA	COIL, PEAKING 10UH
L303	ELESN6R8JA	COIL, PEAKING 6.8UH
L304	ELESN4R7JA	COIL, PEAKING 4.7UH
L331	ELESN100JA	COIL, PEAKING 10UH
L332	ELESN6R8JA	COIL, PEAKING 6.8UH
L333	TLTABT560K	COIL
L334	ELESN4R7KA	COIL, PEAKING 4.7UH
L335	ELEBD101KA	COIL, PEAKING 100UH
L337	TLTABT560K	COIL
L361	ELEBD101KA	COIL, PEAKING 100UH
L362	ELESN100JA	COIL, PEAKING 10UH
L363	ELESN150JA	COIL, PEAKING 15UH
L364	ELESN4R7JA	COIL, PEAKING 4.7UH
L500	TALL08TR82MA	COIL
L501	EXCELSA35T	FERRITE BEAD
L510	EXCELDR25V	FERRITE BEAD
L511	EXCELDR25V	FERRITE BEAD
L515	EXCELDR25V	FERRITE BEAD
L516	EXCELDR25V	FERRITE BEAD
L555	ELH5L718	COIL
L607	TALL08T680KA	LINE FILTER
L701	ELESN100KA	COIL, PEAKING 10UH
L702	EXCELSA35T	FERRITE BEAD
L703	TALFP15B332K	COIL
L704	ELC18B151G	FILTER
L705	TALFP15B332K	COIL
L801	**ELF18D650M**	**CHOKE, AC LINE**
L802	**ELF21N035A**	**LINE FILTER**
L805	EXCELDR25V	FERRITE BEAD
L806	EXCELDR25V	FERRITE BEAD
L808	EXCELDR35V	FERRITE BEAD
L810	EXCELDR25V	FERRITE BEAD
L811	EXCELDR25V	FERRITE BEAD
L815	EXCELSA39E	FERRITE BEAD
L816	EXCELSA39E	FERRITE BEAD
L817	TALL08T680KA	LINE FILTER
L819	EXCELDR35V	FERRITE BEAD
L820	EXCELDR35V	FERRITE BEAD
L821	EXCELDR35V	FERRITE BEAD
L825	TALL08T330KA	LINE FILTER
L826	TALL08T330KA	LINE FILTER
L827	TALL08T330KA	LINE FILTER
L888	TALL08T680KA	LINE FILTER
L901	EXCELSA35T	FERRITE BEAD
L902	EXCELSA35T	FERRITE BEAD
L903	EXCELSA35T	FERRITE BEAD
L933	EXCELSA35T	FERRITE BEAD

REF NO.	PART NO.	DESCRIPTION
L934	EXCELSA35T	FERRITE BEAD
L935	EXCELSA35T	FERRITE BEAD
L961	EXCELSA35T	FERRITE BEAD
L962	EXCELSA35T	FERRITE BEAD
L963	EXCELSA35T	FERRITE BEAD
		TRANSISTORS
Q301	2SC1473A	TRANSISTOR
Q302	2SC3526H	TRANSISTOR
Q303	2SC1473A	TRANSISTOR
Q308	2SA1309ATA	TRANSISTOR
Q309	2SA1480E-RA	TRANSISTOR
Q331	2SC3526H	TRANSISTOR
Q334	2SA1309ATA	TRANSISTOR
Q338	2SA1480E-RA	TRANSISTOR
Q353	2SC3942LB	TRANSISTOR
Q354	2SC3790E-RA	TRANSISTOR
Q355	2SA1480E-RA	TRANSISTOR
Q361	2SC3311ATA	TRANSISTOR
Q362	2SC3311ATA	TRANSISTOR
Q363	2SC3526H	TRANSISTOR
Q364	2SA1309ATA	TRANSISTOR
Q365	2SC3311ATA	TRANSISTOR
Q366	2SC3311ATA	TRANSISTOR
Q367	2SA1309ATA	TRANSISTOR
Q368	2SA1309ATA	TRANSISTOR
Q370	2SA1480E-RA	TRANSISTOR
Q373	2SC3942LB	TRANSISTOR
Q374	2SC3790E-RA	TRANSISTOR
Q375	2SA1480E-RA	TRANSISTOR
Q393	2SC3942LB	TRANSISTOR
Q394	2SC3790E-RA	TRANSISTOR
Q395	2SA1480E-RA	TRANSISTOR
Q406	2SD601ARTX	TRANSISTOR
Q501	2SK2962TPE6	TRANSISTOR
Q502	2SK2847LBMAT	TRANSISTOR
Q503	2SD601ARTX	TRANSISTOR
Q509	2SC1473QR	TRANSISTOR
Q510	2SC1473QR	TRANSISTOR
Q551	2SC5612LB228	TRANSISTOR
Q601	2SD601ARTX	TRANSISTOR
Q602	2SD601ARTX	TRANSISTOR
Q603	2SD601ARTX	TRANSISTOR
Q604	2SD601ARTX	TRANSISTOR
Q605	2SB709ARTX	TRANSISTOR
Q606	2SD601ARTX	TRANSISTOR
Q701	2SK2538000LB	TRANSISTOR
Q801	2SK2917LB	TRANSISTOR
Q802	2SD601ARTX	TRANSISTOR
Q803	2SB709ARTX	TRANSISTOR
Q854	2SA19610QAHW	TRANSISTOR
Q901	2SA720ARTA	TRANSISTOR

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

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REF NO.	PART NO.	DESCRIPTION
Q904	2SC1318ARTA	TRANSISTOR
Q934	2SA720TA	TRANSISTOR
Q935	2SC1318ATA	TRANSISTOR
Q936	2SC1318ATA	TRANSISTOR
Q937	2SA720TA	TRANSISTOR
Q938	2SA720ARTA	TRANSISTOR
Q941	2SC1318ARTA	TRANSISTOR
Q955	2SA1535ALB	TRANSISTOR
Q956	2SC3944ALB	TRANSISTOR
Q957	2SA1535ALB	TRANSISTOR
Q958	2SC3944ALB	TRANSISTOR
Q959	2SA1535ALB	TRANSISTOR
Q960	2SC3944ALB	TRANSISTOR
Q961	2SA720ARTA	TRANSISTOR
Q964	2SC1318ARTA	TRANSISTOR
Q1503	2SA1309ATA	TRANSISTOR
Q1504	2SC4635-YB7	TRANSISTOR
Q1505	2SC3311ATA	TRANSISTOR
	RELAYS	
RL801	**K6B1ADA00010**	**RELAY**
RL802	**K6B1ADA00010**	**RELAY**
	RESISTORS	
JS063	ERDS2TJ124T	RES,C 120K-J-1/4W
R013	ERG1SJ273P	RES,M 27K-J-1W
R015	ERG1SJ273P	RES,M 27K-J-1W
R072	ERDS2TJ101T	RES,C 100-J-1/4W
R073	ERDS2TJ471T	RES,C 470-J-1/4W
R080	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R081	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R082	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R083	ERDS2TJ512T	RES,C 5.1K-J-1/4W
R084	ERDS2TJ912T	RES,C 9.1K-J-1/4W
R086	ERDS2TJ102T	RES,C 1K-J-1/4W
R087	ERDS2TJ331T	RES,C 330-J-1/4W
R301	ERDS1FJ394P	RES,C 390K-J-1/2W
R302	ERDS2TJ151T	RES,C 150-J-1/4W
R303	ER0S2TKF2200	RES,M 220-F-1/4W
R304	ERDS2TJ334T	RES,C 330K-J-1/4W
R305	ER0S2TKF2200	RES,M 220-F-1/4W
R306	ER0S2TKF1401	RES,M 1400-F-1/4W
R308	ERDS2TJ334T	RES,C 330K-J-1/4W
R310	ERDS2TJ183T	RES,C 18K-J-1/4W
R311	ERDS2TJ470T	RES,C 47-J-1/4W
R312	ERG7ZJ272	RES,M 2.7K-J-7W
R314	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R315	ERDS2TJ563T	RES,C 56K-J-1/4W
R316	ERDS2TJ821T	RES,C 820-J-1/4W
R317	ERDS2TJ822T	RES,C 8.2K-J-1/4W
R319	ERG12SJ101P	RES,M 100-J-1W
R320	ERDS1FJ330P	RES,C 33-J-1/2W
R321	ERDS1FJ330P	RES,C 33-J-1/2W

REF NO.	PART NO.	DESCRIPTION
R322	ERG12SJ101P	RES,M 100-J-1W
R323	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R325	ERDS2TJ473T	RES,C 47K-J-1/4W
R327	ERC12GK331D	RES,C 330-K-1/2W
R328	ERDS1TJ104T	RES,C 100K-J-1/2W
R331	ER0S2TKF2200	RES,M 220-F-1/4W
R332	ERDS2TJ151T	RES,C 150-J-1/4W
R333	ER0S2TKF2200	RES,M 220-F-1/4W
R335	ER0S2TKF1401	RES,M 1400-F-1/4W
R342	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R343	ERDS2TJ822T	RES,C 8.2K-J-1/4W
R345	ERDS2TJ470T	RES,C 47-J-1/4W
R346	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R347	ERG7ZJ272	RES,M 2.7K-J-7W
R348	ERDS2TJ563T	RES,C 56K-J-1/4W
R349	ERDS2TJ821T	RES,C 820-J-1/4W
R350	ERG12SJ101P	RES,M 100-J-1W
R351	ERDS1FJ330P	RES,C 33-J-1/2W
R352	ERDS1FJ330P	RES,C 33-J-1/2W
R353	ERG12SJ101P	RES,M 100-J-1W
R354	ERDS2TJ473T	RES,C 47K-J-1/4W
R356	ERC12GK331D	RES,C 330-K-1/2W
R357	ERDS1TJ104T	RES,C 100K-J-1/2W
R361	ER0S2TKF2002	RES,M 20K-F-1/4W
R362	ER0S2TKF1002	RES,M 10K-F-1/4
R364	ERDS2TJ102T	RES,C 1K-J-1/4W
R365	ERDS2TJ221T	RES,C 220-J-1/4W
R366	ERDS2TJ151T	RES,C 150-J-1/4W
R367	ER0S2TKF2200	RES,M 220-F-1/4W
R368	ER0S2TKF2200	RES,M 220-F-1/4W
R369	ERDS2TJ472T	RES,C 4.7K-J-1/4
R371	ER0S2TKF1401	RES,M 1400-F-1/4W
R372	ER0S2TKF2700	RES,M 270-F-1/4W
R375	ERDS2TJ470T	RES,C 47-J-1/4W
R376	ERG7ZJ272	RES,M 2.7K-J-7W
R377	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R378	ERDS2TJ822T	RES,C 8.2K-J-1/4W
R379	ERDS2TJ563T	RES,C 56K-J-1/4W
R380	ERDS2TJ821T	RES,C 820-J-1/4W
R382	ERDS2TJ182T	RES,C 1.8K-J-1/4W
R383	ERG12SJ101P	RES,M 100-J-1W
R384	ERDS1FJ330P	RES,C 33-J-1/2W
R385	ERDS1FJ330P	RES,C 33-J-1/2W
R386	ERG12SJ101P	RES,M 100-J-1W
R389	ERDS2TJ473T	RES,C 47K-J-1/4W
R390	ERC12GK331D	RES,C 330-K-1/2W
R391	ERDS1TJ104T	RES,C 100K-J-1/2W
R392	ER0S2TKF1372	RES,M 13.7K-F-1/4W
R393	ER0S2TKF8201	RES,M 8.2K-F-1/4W
R394	ERDS2TJ102T	RES,C 1K-J-1/4W
R395	ERDS2TJ221T	RES,C 220-J-1/4W

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R396	ERDS2TJ472T	RES,C 4.7K-J-1/4
R397	ER0S2TKF1201	RES,M 1.2K-F-1/4W
R398	ER0S2TKF2000	RES,M 200-F-1/4W
R408	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R409	ERDS2TJ563T	RES,C 56K-J-1/4W
R410	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R411	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R412	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R415	ERG3FJ331H	RES,M 330-J-3W
R421	ERJ6GEYJ273V	RES,M 27K-J-1/10W PT-56HX41E/CE, PT-61HX41E/CE
R422	ERJ6GEYJ101V	RES,M 100-J-1/10W PT-56HX41E/CE, PT-61HX41E/CE
R423	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R425	ERDS1FJ1R0P	RES,C 1.0-J-1/2W
R426	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R428	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R434	ERX12SJ1R8P	RES,M 1.8-J-1/2W
R435	ERX12SJ1R8P	RES,M 1.8-J-1/2W
R465	ERDS2TJ392T	RES,C 3.9K-J-1/4W
R466	ERDS2TJ562T	RES,C 5.6K-J-1/4W
R470	ERDS2TJ331T	RES,C 330-J-1/4W
R471	ERDS2TJ331T	RES,C 330-J-1/4W
R472	ERDS2TJ331T	RES,C 330-J-1/4W
R501	ERDS2TJ104T	RES,C 100K-J-1/4W
R502	ERDS2TJ680T	RES,C 68-J-1/4W
R503	ERG2FJ180H	RES,M 18-J-2W
R504	ERG3FJ271H	RES,M 270-J-3W
R505	ERG1SJ120P	RES,M 12-J-1W
R506	ERX1SJR47P	RES,M .47-J-1W
R513	ERDS2TJ471T	RES,C 470-J-1/4W
R514	ER0S2TKF3322	RES,M 33.2K-F-1/4W
R515	ER0S2TKF4702	RES,M 4.7K-F-1/4W
R516	ERJ6GEYJ101V	RES,M 100-J-1/10W
R517	ERDS2TJ103T	RES,C 10K-J-1/4W
R518	ERX12SJR22V	RES,M .22-J-1/2
R519	ERQ12HKR22P	RES,F .22-K-1/2W
R520	**ERQ12HJ330P**	**RES,F 33-J-1/2W**
R521	**ER0S2TKF2612**	**RES,M 26.1K-F-1/4W**
R522	**ER0S2TKF7151**	**RES,M 7.15K-F-1/4W**
R523	ERDS2TJ275T	RES,C 2.7MEG-J-1/4W
R524	EVM38GA00B54	CONTROL 5K
R525	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R534	ERDS2TJ224T	RES,C 220K-J-1/4W
R535	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R536	ERDS2TJ101T	RES,C 100-J-1/4W
R537	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R538	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R539	ERDS2TJ393T	RES,C 39K-J-1/4W
R541	ERDS2TJ563T	RES,C 56K-J-1/4W
R550	ERDS2TJ273T	RES,C 27K-J-1/4W
R601	ERJ6GEYJ101V	RES,M 100-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R602	ERJ6GEYJ101V	RES,M 100-J-1/10W
R603	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R604	ERJ6GEYJ101V	RES,M 100-J-1/10W
R605	ERJ6GEYJ101V	RES,M 100-J-1/10W
R606	ERJ6GEYJ101V	RES,M 100-J-1/10W
R607	ER0S2TKF6201	RES,M 200-F-1/4W
R608	ERJ6ENF3830V	RES,M 383-F-1/10W
R609	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R610	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R611	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R612	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R613	ERDS2TJ561T	RES,C 560-J-1/4W
R614	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R615	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R616	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R617	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R618	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R619	ERDS2TJ331T	RES,C 330-J-1/4W
R620	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R621	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R622	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R623	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R624	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R625	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R626	ERG1SJ122P	RES,M 1.2K-J-1W
R627	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R628	ERDS2TJ391T	RES,C 390-J-1/4W
R629	ERJ6GEYJ100V	RES,M 10-J-1/10W
R630	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R631	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R632	ERJ6GEYJ331V	RES,M 330-J-1/10W
R633	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W
R634	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R635	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R636	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R637	ERDS2TJ101T	RES,C 100-J-1/4W
R638	ERDS2TJ101T	RES,C 100-J-1/4W
R642	ERDS2TJ101T	RES,C 100-J-1/4W
R643	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R644	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R645	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R653	ERDS2TJ101T	RES,C 100-J-1/4W
R654	ERDS2TJ184T	RES,C 180K-J-1/4W
R655	ERDS2TJ184T	RES,C 180K-J-1/4W
R704	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R706	ERDS1FJ680T	RES,C 68-J-1/2W
R707	ERG2FJ222H	RES,M 2.2K-J-2W
R708	ERF5AK4R7H	RES,W 4.7-K-5W
R709	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R800	**ERU5TCK1R5T**	**RES,F 1.5-K-5W**
R805	ERDS2TJ101T	RES,C 100-J-1/4W

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R808	ERX12SZJR12P	RES,M .12-J-1/2W
R809	ERJ6GEYJ225V	RES,M 2.2M-J-1/10W
R810	ERX12SZJR12P	RES,M .12-J-1/2W
R811	ERX12SZJR12P	RES,M .12-J-1/2W
R812	ERDS2TJ103T	RES,C 10K-J-1/4W
R813	ERDS1FJ561T	RES,C 560-J-1/2
R814	ERDS2TJ4R7T	RES,C 4.7-J-1/4W
R815	ERJ6GEYJ471V	RES,M 470-J-1/10W
R816	ERDS2TJ471T	RES,C 470-J-1/4W
R817	ERJ6ENF2001V	RES,M 2K-F-1/10W
R818	ERDS1FJ100T	RES,C 10-J-1/2W
R820	ERDS1FJ470T	RES,C 47-J-1/2W
R822	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R832	**ERD75TAJ825**	**RES,C 8.2MEG-J-3/4W**
R833	ERJ6GEYJ101V	RES,M 100-J-1/10W
R835	ERDS2TJ101T	RES,C 100-J-1/4W
R836	ERJ6GEYJ101V	RES,M 100-J-1/10W
R839	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R840	ERJ6GEYJ101V	RES,M 100-J-1/10W
R846	ERDS2TJ223T	RES,C 22K-J-1/4W
R847	ERDS2TJ272T	RES,C 2.7K-J-1/4W
R857	ERX1SJ1R0P	RES,M 1.0-J-1W
R858	ERX1SJ1R0P	RES,M 1.0-J-1W
R859	ERDS2TJ103T	RES,C 10K-J-1/4W
R860	ERDS1FJ222T	RES,C 2200-J-1/2W
R862	ERG3FJ333H	RES,M 33K-J-3W
R865	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R866	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R867	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R880	TSF39402	FUSE 4.0A/125V
R881	TSF39402	FUSE 4.0A/125V
R895	ERDS2TJ100T	RES,C 10-J-1/4W
R896	ERDS1FJ820T	RES,C 82-J-1/2W
R901	ERDS2FJ122T	RES,C 1.2K-J-1/2W
R902	ERDS2TJ103T	RES,C 10K-J-1/4W
R903	ERDS2TJ683T	RES,C 68K-J-1/4W
R904	ERDS2TJ683T	RES,C 68K-J-1/4W
R905	ERDS2TJ103T	RES,C 10K-J-1/4W
R906	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R907	ERDS1FJ390T	RES,C 39-J-1/2W
R908	ERDS1FJ390T	RES,C 39-J-1/2W
R909	ERDS1FJ8R2T	RES,C 8.2-J-1/2W
R910	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R911	ERG1SJ271P	RES,M 270-J-1W
R942	ERDS1FJ152T	RES,C 1.5K-J-1/2W
R943	ERDS1FJ152T	RES,C 1.5K-J-1/2W
R946	ERQ14AJ100P	RES,F 10-J-1/4W
R947	ERQ14AJ120P	RES,F 12-J-1/4W
R948	ERDS2FJ122T	RES,C 1.2K-J-1/2W

REF NO.	PART NO.	DESCRIPTION
R949	ERDS2TJ103T	RES,C 10K-J-1/4W
R950	ERDS2TJ683T	RES,C 68K-J-1/4W
R951	ERDS2TJ683T	RES,C 68K-J-1/4W
R952	ERDS2TJ103T	RES,C 10K-J-1/4W
R953	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R954	ERDS1FJ390T	RES,C 39-J-1/2W
R955	ERDS1FJ390T	RES,C 39-J-1/2W
R956	ERDS1FJ8R2T	RES,C 8.2-J-1/2W
R957	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R958	ERG1SJ271P	RES,M 270-J-1W
R961	ERDS2FJ122T	RES,C 1.2K-J-1/2W
R962	ERDS2TJ103T	RES,C 10K-J-1/4W
R963	ERDS2TJ683T	RES,C 68K-J-1/4W
R964	ERDS2TJ683T	RES,C 68K-J-1/4W
R965	ERDS2TJ103T	RES,C 10K-J-1/4W
R966	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R967	ERDS1FJ390T	RES,C 39-J-1/2W
R968	ERDS1FJ390T	RES,C 39-J-1/2W
R969	ERDS1FJ8R2T	RES,C 8.2-J-1/2W
R970	ERDS2TJ8R2T	RES,C 8.2-J-1/4W
R971	ERG1SJ271P	RES,M 270-J-1W
R1501	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1503	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1504	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R1505	ERDS2TJ102T	RES,C 1K-J-1/4W
R1506	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R1507	ERG3SJD222L	RES,M 2200-J-3W
R1508	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R1510	ERG2SJD273L	RES,M 27K-J-2W
R1511	ERG2SJD273L	RES,M 27K-J-2W
R1512	ERJ6ENF1501V	RES,M 1.5K-F-1/10W
R1514	ERG2SJD273L	RES,M 27K-J-2W
R1515	ERJ6ENF1001V	RES,M 1K-F-1/10W
R1516	ERJ6GEYJ101V	RES,M 100-J-1/10W
R1517	ERJ6ENF3571V	RES,M 3.57K-F-1/10W
R1518	ERG2SJD273L	RES,M 27K-J-2W
R1519	ERDS2TJ101T	RES,C 100-J-1/4W
R1520	ERDS2TJ221T	RES,C 220-J-1/4W
R1521	ER0S2TKF5100	RES,M 510-F-1/4W
R1522	ERC12GK103D	RES,C 10K-K-1/2W
R1523	ERDS2TJ104T	RES,C 100K-J-1/4W
R1524	ER0S2TKF9100	RES,M 910-F-1/4W
R1526	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R1527	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R1528	ERDS2TJ332T	RES,C 3.3K-J-1/4W
R1529	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R1542	ERG2SJD273L	RES,M 27K-J-2W
R1544	ERJ6GEYJ471V	RES,M 470-J-1/10W
R1546	ERJ6GEYJ221V	RES,M 220-J-1/10W

REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R1599	ERJ6ENF9761V	RES,M 9760-F-1/10W
		SWITCHES
S010	SKHHDTA010	SWITCH
S011	SKHHDTA010	SWITCH
S012	SKHHDTA010	SWITCH
S013	SKHHDTA010	SWITCH
S014	SKHHDTA010	SWITCH
S015	SKHHDTA010	SWITCH
S016	SKHHDTA010	SWITCH
		TRANSFORMERS
T501	ETH19K186AM	TRANSFORMER
T551	**KFT7AA334F1**	**TRANSFORMER, FLYBACK**
T801	**ETS39AG2U5BC**	**TRANSFORMER, SWITCHING**
T802	**ETP30KB941JG**	**TRANSFORMER**
		CRISTALS / FILTERS
X601	TAFCSB503F30	CRYSTAL
		OTHERS
M001	**ENG36602G**	**TUNNER**
M002	**ENG36603G**	**TUNNER**
M003	UR76EC0303A	BATTERY COVER, REMOTE CONTROL
M004	ENPE630	SPLITTER, RF
M005	EUR7603Z20	TRANSMITTER, REMOTE CONTROL
M006	KFT7CP336F	TRANSFORMER DISTRIBUTOR
M007	TXF3A01ECV	ASSY, DAG GND
M008	TJSC00700	CRT SOCKET
M009	KRCBC160928B	RING CORE (NOISE FILTERS) PT-56HX41E/CE PT-61HX41E/CE
M010	**TXFCRT07ESER**	**ASSY, CRT (B) PT-56HX41E/CE**
M011	**TXFCRT08ESER**	**ASSY, CRT (G) PT-56HX41E/CE**
M012	**TXFCRT09ESER**	**ASSY, CRT (R) PT-56HX41E/CE**
M013	**TXFCRT97SER**	**ASSY, CRT (B) PT-51HX41E/CE PT-61HX41E/CE**
M014	**TXFCRT98SER**	**ASSY, CRT (G) PT-51HX41E/CE PT-61HX41E/CE**
M015	**TXFCRT99SER**	**ASSY, CRT (R) PT-51HX41E/CE PT-61HX41E/CE**
DY	**KDY2ASC29F**	**YOKE, DEFLECTION**
M016	TKD2AX0621	INNER BARRIER BOARD PT-51HX41E/CE
M017	TKD2AX0691	INNER BARRIER BOARD PT-61HX41E /CE
M018	TKD2AX0971	INNER BARRIER BOARD PT-56HX41E/CE
M019	TKE2AA00121	FRAME, SCREEN PT-61HX41E/CE
M020	TKE2AA00805S	ASSY, SCREEN FRAME PT-56HX41E/CE
M021	TKGF5005	LENS, PTV PT-51HX41E/CE PT-61HX41E/CE
M022	TKG2AA50051	MIRROR, GLASS PT-51HX41E/CE

REF NO.	PART NO.	DESCRIPTION
M023	TKG2AA50061	MIRROR, GLASS PT-61HX41E/CE
M024	TKG2AA50081	MIRROR, GLASS PT-56HX41E/CE
M025	TXFLB02ESER	ASSY, LIGHT BOX PT-51HX41E/CE
M026	TXFLB07ESER	ASSY, ADJUSTED LIGHT BOX PT-61HX41E/CE
M027	TXFLB08ESER	ASSY, ADJUSTED LIGHT BOX PT-56HX41E/CE
M028	TMK2AX00302	SHEET, LIGHT COVER
M029	TKG2AH50351	SCREEN, FRESNEL PT-61HX41E/CE
M030	TKG2AH50361	SCREEN, FRESNEL PT-56HX41E/CE
M031	TKG2AH50371	SCREEN, FRESNEL PT-51HX41E/CE
M032	TKG2AD00032	SCREEN PANEL, PROTECTIVE PT-56HX41E/CE
M033	TKG2AD00042	SCREEN PANEL, PROTECTIVE PT-51HX41E/CE
M034	TKG2AD00052	SCREEN PANEL, PROTECTIVE PT-61HX41E/CE
M035	TKG2AH50431	SCREEN, LENTICULAR PT-61HX41E/CE
M036	TKG2AH50441	SCREEN, LENTICULAR PT-56HX41E/CE
M037	TKG2AH50451	SCREEN, LENTICULAR PT-51HX41E/CE
M038	TNXB003	FOCUS BLOCK
M039	TKY2AA1606S	CABINET FRONT PT-51HX41E/CE
M040	TKU2AA02501	CABINET BACK, LOWER PT-56HX41E/CE
M041	TKU2AA02901	CABINET BACK, LOWER PT-61HX41E/CE
M042	TKU2AA02401	CABINET BACK, LOWER PT-51HX41E/CE
M043	TKU2AC1401S	CABINET BACK COVER PT-51HX41E/CE
JK3001	TJB2AA0311	TERMINAL, A/V (REAR)
M044	TKB2AA0118S	CABINET WOOD, PTV PT-61HX41E/CE
M045	TKB2AA0143S	CABINET., WOOD BASE PT-51HX41E/CE
M046	TKB2AA0164S	CABINET WOOD PTV PT-56HX41E/CE
M047	**TSX2AA0291**	**A/C LINE CORD W/FILTERS**
M048	TKP2AA02802S	ASSY, SPEAKER GRILLE (LEFT) PT-51HX41E/CE
M049	TKP2AA02804S	ASSY, SPEAKER GRILLE (RIGHT) PT-51HX41E/CE
M050	TKP2AA02806S	ASSY, SPEAKER GRILLE (LEFT) PT-56HX41E/CE
M051	TKP2AA02808S	ASSY, SPEAKER GRILLE (RIGHT) PT-56HX41E/CE
M052	TAS2AA0026	SPEAKER 15 WATTS
M053	TKP2AA0423S	ASSY, FRONT DOOR

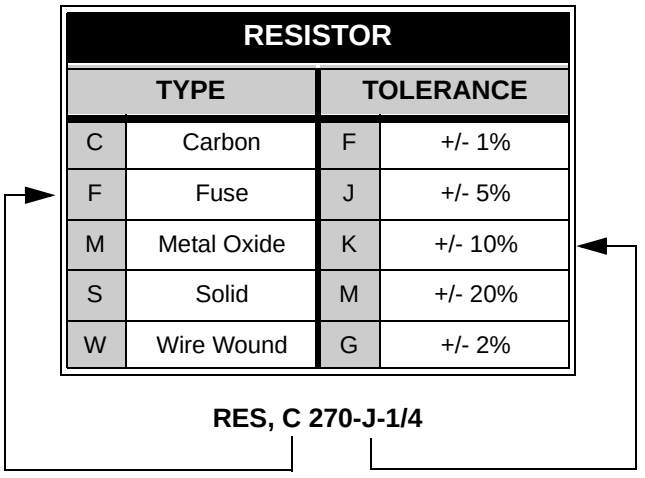
REPLACEMENT PARTS LIST

Models: PT-51HX41E/CE, PT-56HX41E/CE & PT-61HX41E/CE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

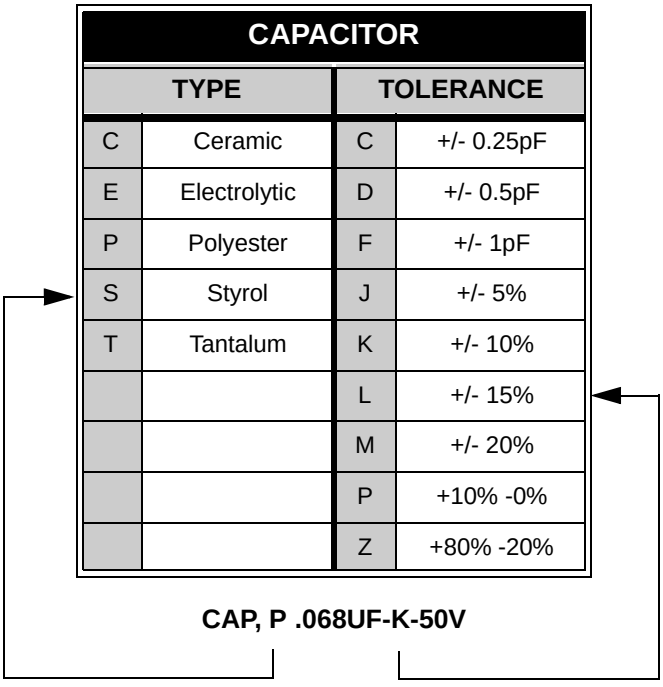
REF NO.	PART NO.	DESCRIPTION
M054	TKP2AA0522S	ASSY, CENTER COVER PT-51HX41E/CE
M055	TKP2AA0524S	ASSY, CENTER COVER PT-56HX41E/CE PT-61HX41E/CE
M056	TKP2AA02310S	ASSY, SIDE GRILLE(LEFT) PT-61HX41E/CE
M057	TKP2AA02312S	ASSY, SIDE GRILLE (RIGHT) PT-61HX41E/CE
M058	TKP2AA0532S	ASSY, CONTROL PANEL PT-51HX41E/CE
M059	TKP2AA0534S	ASSY, CONTROL PANEL PT-56HX41E/CE PT-61HX41E/CE
JK1001	TJB2A10012	TERMINAL, A/V (FRONT)
M060	TBL2AH30031	CASTER (STATIONARITY)
M061	TBL2A3106	CASTER (PIVOT)
M062	TEKX008	DOOR CATCH
M063	TBM2AA0012	BADGE, PANASONIC
M064	TBX2AA2401S	ASSY, 7-KEY BUTTON
M065	TQB2AA7076	V-CHIP ROLLER GUIDE
M066	TQB2AA0381	MANUAL, OWNERS PT-51HX41E, PT-56HX41E PT-61HX41E
M067	TQB2AA400	MANUAL, OWNERS PT-51HX41CE PT-56HX41CE PT-61HX41CE
M068	TQB2AA7098	REMOTE CONTROL GUIDE

REPLACEMENT PARTS LIST DESCRIPTION OF ABBREVIATIONS GUIDE



RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	+/- 1%
F	Fuse	J	+/- 5%
M	Metal Oxide	K	+/- 10%
S	Solid	M	+/- 20%
W	Wire Wound	G	+/- 2%

RES, C 270-J-1/4



CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	+/- 0.25pF
E	Electrolytic	D	+/- 0.5pF
P	Polyester	F	+/- 1pF
S	Styrol	J	+/- 5%
T	Tantalum	K	+/- 10%
		L	+/- 15%
		M	+/- 20%
		P	+10% -0%
		Z	+80% -20%

CAP, P .068UF-K-50V

SCHEMATIC NOTES:

1. RESISTOR

All resistors are carbon 1/4W resistor, unless otherwise noted by the following marks.
Unit of resistance is ohm (Ω), (K=1,000, M=1,000,000)

◯	Non Flammable	△	Solid
☒	Metal Oxide	◎	Metal (Precision and high stability)
□	Wire Wound	▬	Thermistor
⊗	Fusible	▭	Positive coefficient Thermistor
▨	Flame Proof Rectangular		

2. CAPACITOR

All capacitors are ceramic 50V capacitor, unless otherwise noted by the following marks.
Unit of capacitance is μF, unless otherwise noted.

+⊟-	Electrolytic	☒	Metalized Polyester
Ⓣ	Tantalum	ⓜ	Polyprolene
NP	Bipolar	△	Mica
Ⓢ	Polystyrene	◯	Ceramic
⊗	Temperature Compensation	◎	Ceramic (SL)
Ⓜ	Polyester		

3. COIL

Unit of inductance is μH, unless otherwise noted.

4. VOLTAGE MEASUREMENT

Voltage is measured by a digital meter receiving normal signal.

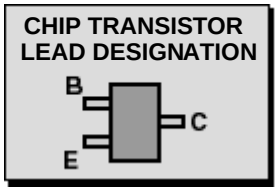
Note: *These schematic diagrams are the latest at the time of printing and are subject to change without notice.*

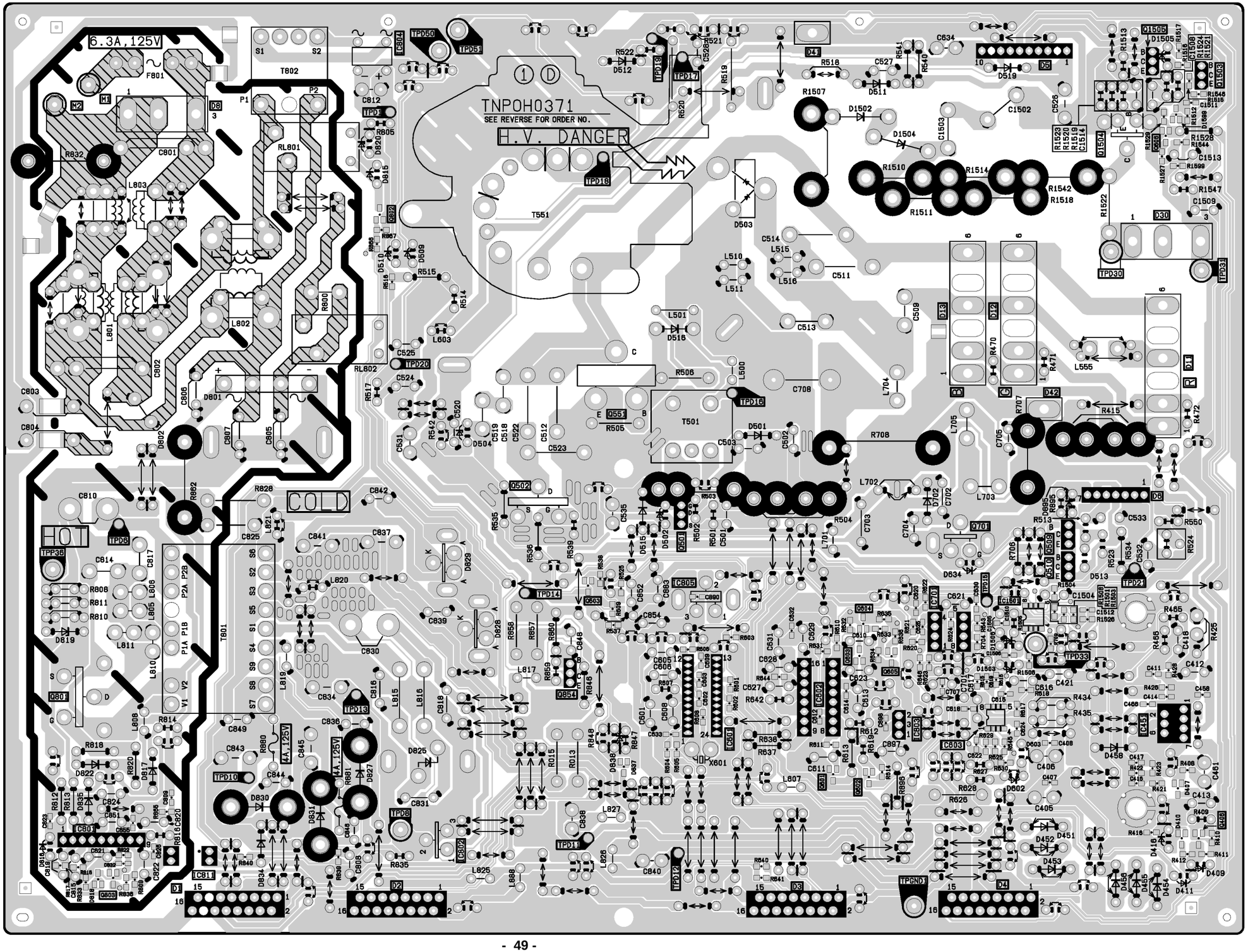
SERVICE NOTES:

This model has section that does not share a common ground with the power supply section. The different sections are referred to as HOT section and COLD section in the precautions below.

1. Do not touch the HOT section and the COLD section at the same time. You may seceive an electric shock.
2. Do not short the HOT section to the COLD section. Thi could blow the fuse or damage parts.
3. Never measure the HOT section and the COLD section at the same time when using tools such as oscilloscopes or multimeters.
4. Always unplug the unit before beginning any operation such as removing the chassis.

Chip Transistor Lead Designation




6.3A,125V
F801
T802
S1
S2
P1
P2
M1
M2
D8
3
C812
TPD50
TPD51
TPD1
R805
D820
D815
C804
TNP0H0371
SEE REVERSE FOR ORDER NO.
H.V. DANGER
TPD18
T551
R932
C801
L803
RL801
L801
L802
R800
C802
C806
D801
C807
C805
C803
C804
D802
R862
C810
HOT
TPD6
TPP36
C814
C817
R808
R811
R810
L805
L806
D819
L811
L810
Q801
S
D
G
R814
C808
R818
D822
R820
D817
R812
R813
D835
C824
C851
C801
C855
C821
C822
C828
C809
R816
C820
D816
C819
R815
C832
R833
C815
R834
D818
Q803
R836
R809
D1
C811
R840
D834
C849
C843
R880
4A,125V
C845
C844
TPD10
D830
D831
C846
R839
C808
C836
4A,125V
R881
D827
D825
C831
TPD8
R835
D2
C842
COLD
R826
C825
L821
C841
C837
L820
D829
C839
C830
C834
C816
L815
L816
C818
L819
L817
R859
Q854
R848
R846
R856
R857
R860
C848
Q853
TPD13
TPD14
Q503
R535
R536
R539
R538
R525
R526
C852
C853
R537
R506
R507
R508
R509
R510
R511
R512
R513
R514
R515
R516
R517
C525
TPD20
C524
L603
C526
C527
C528
C529
C530
C531
R541
R542
C532
C533
C534
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C538
C539
C540
C541
C542
C543
C544
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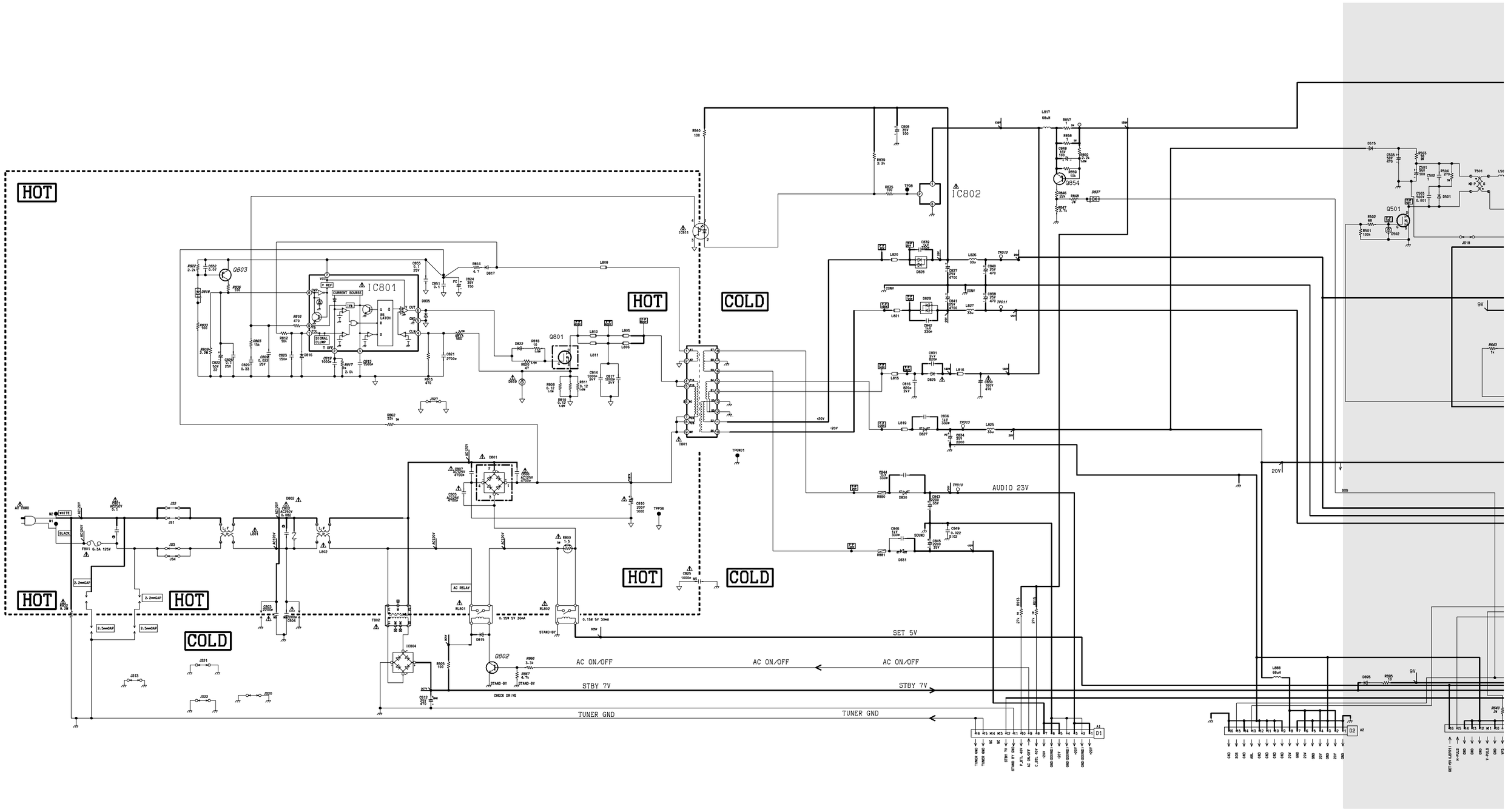
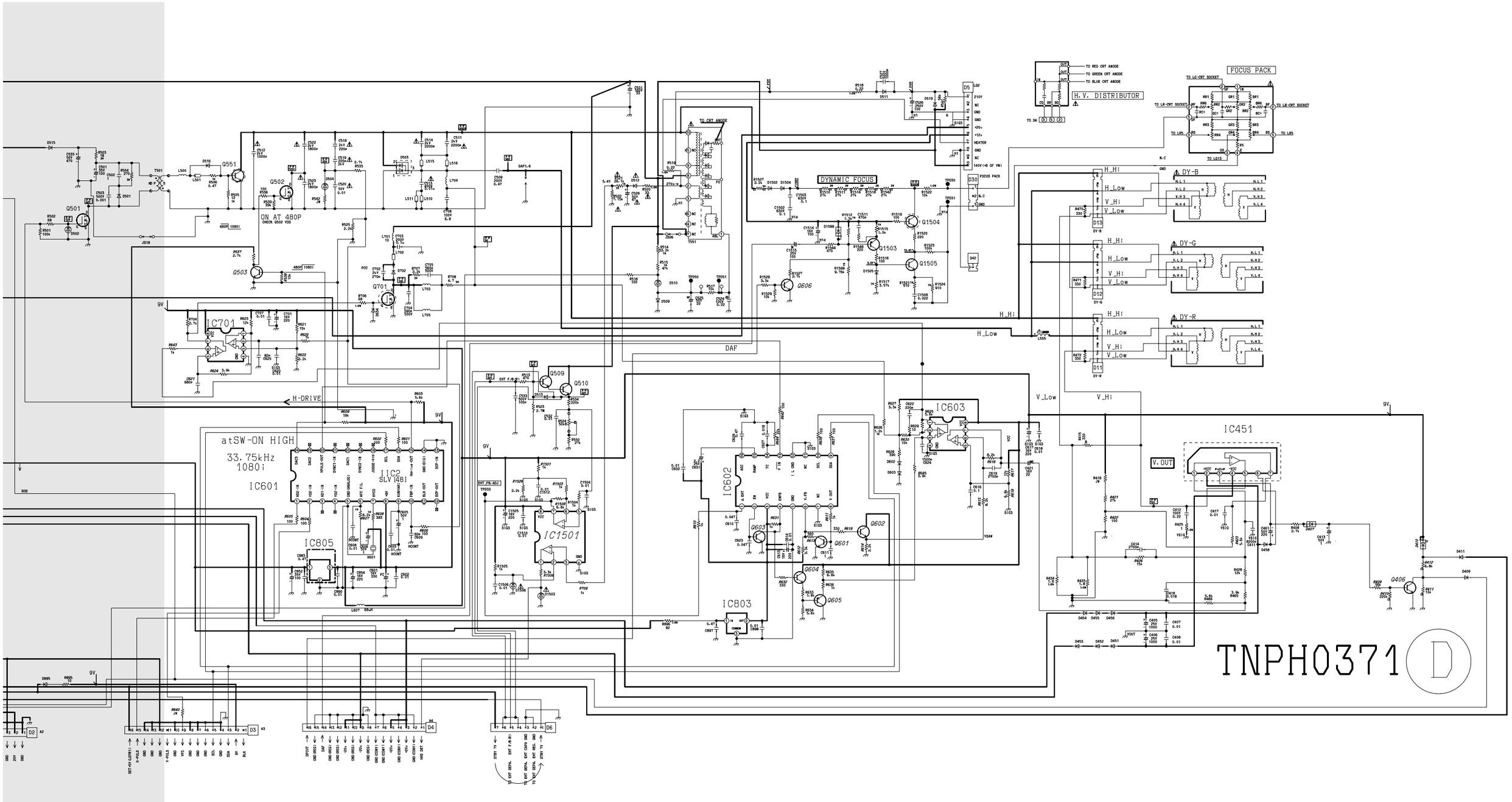
C565
C566
C567
C568
C569
C570
C571

D-Board Schematic, Left Portion

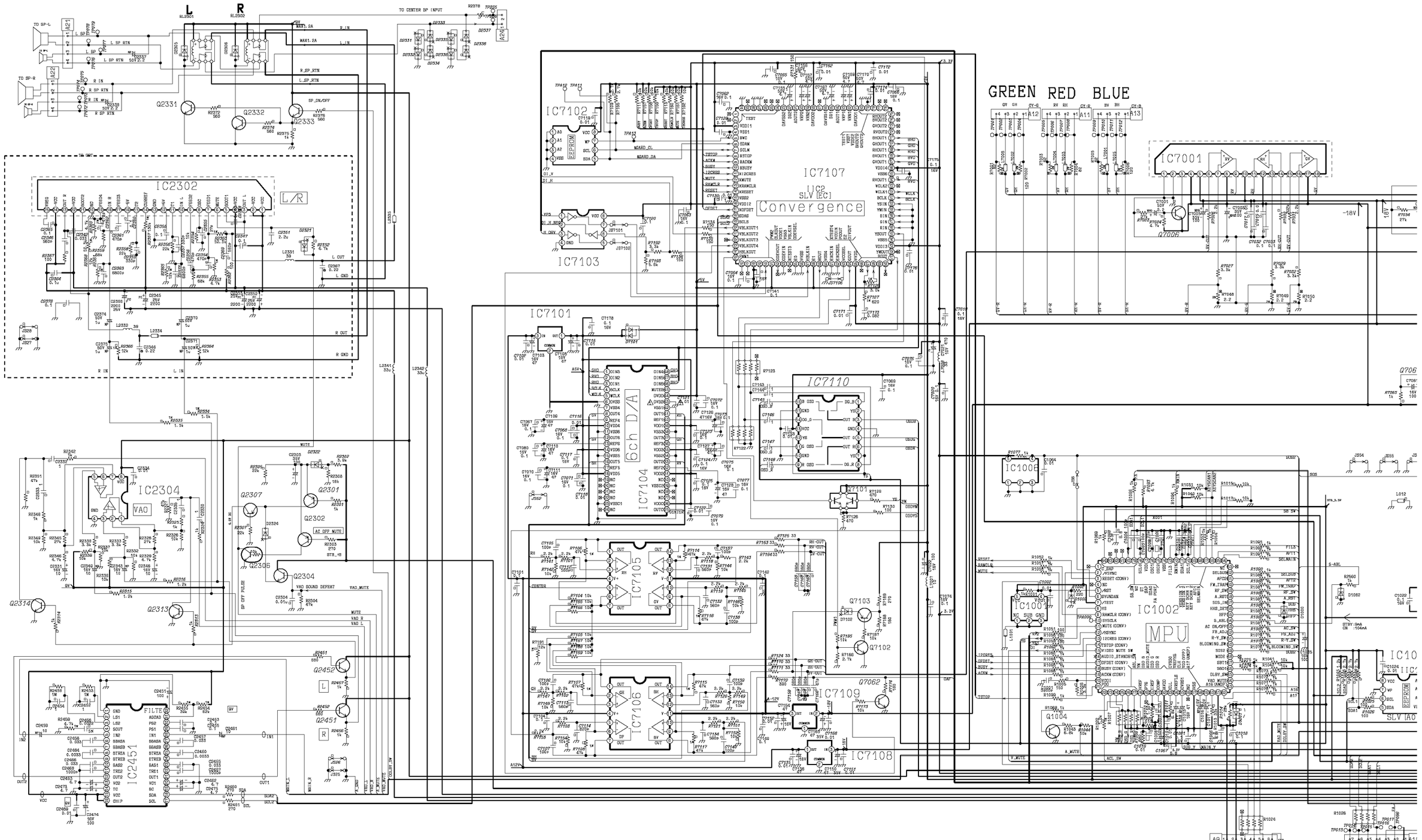


D-Board Schematic, Right Portion

ALL MODELS

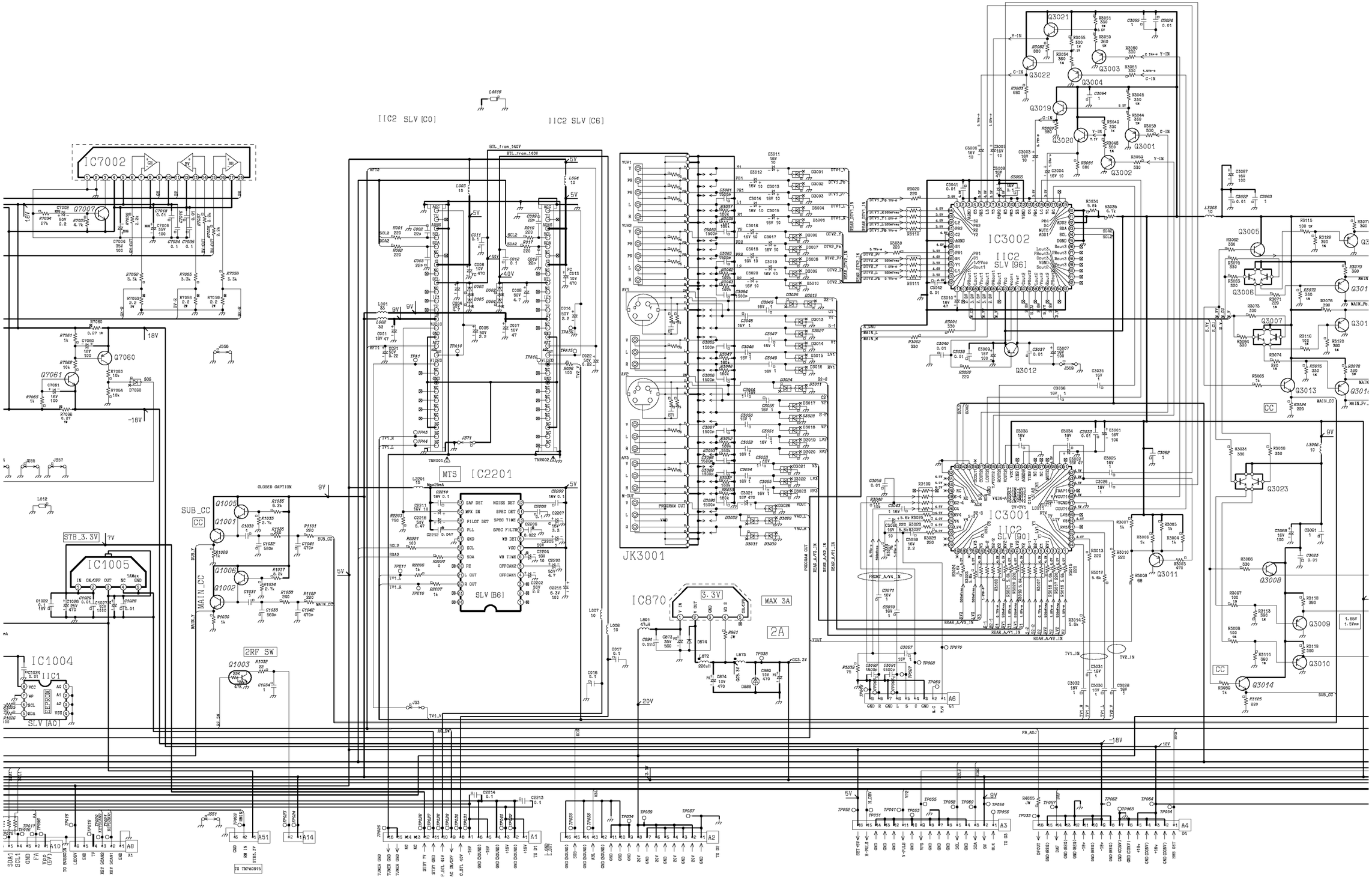


A-Board Schematic, Left Portion

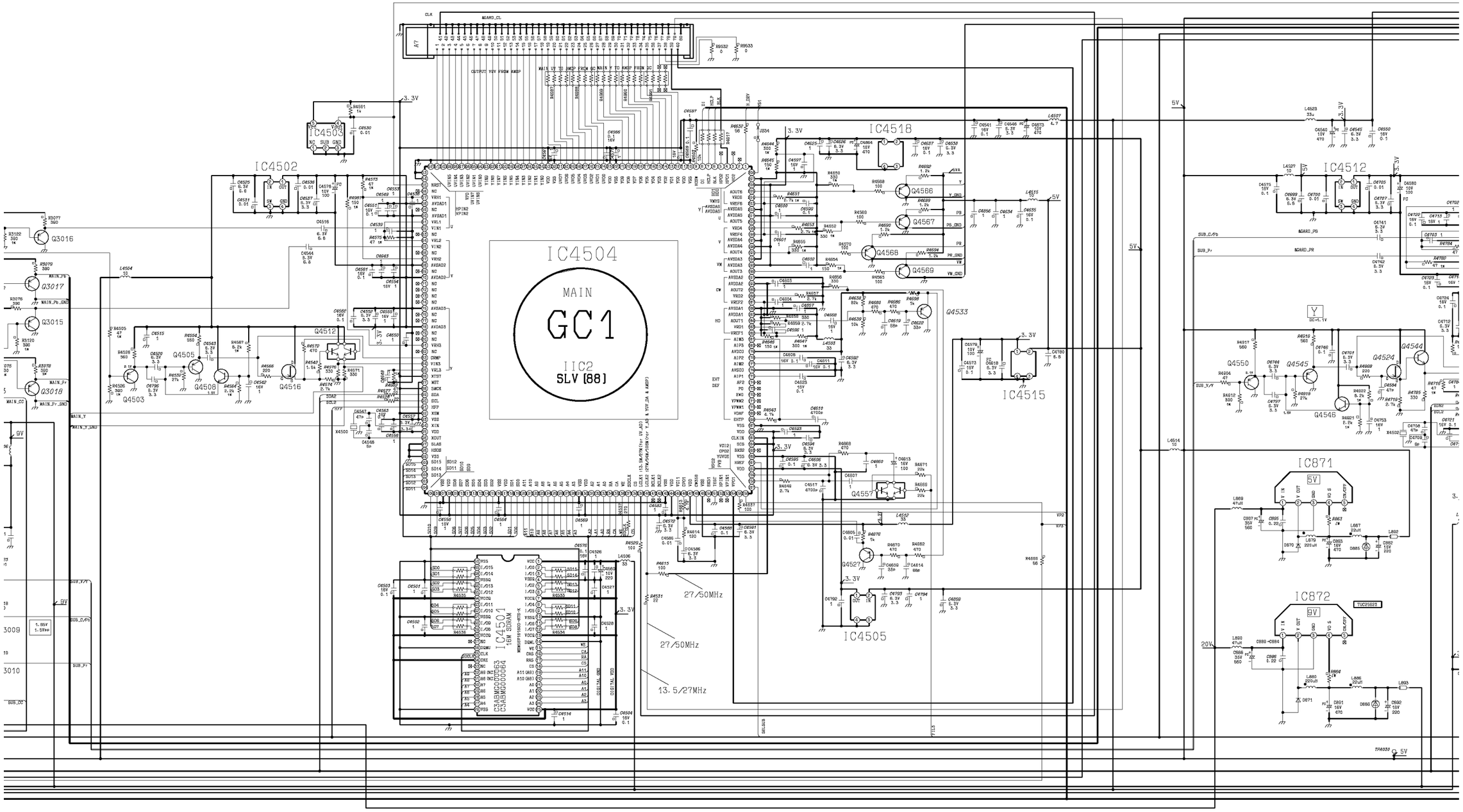


A-Board Schematic, Left Middle Portion

ALL MODELS

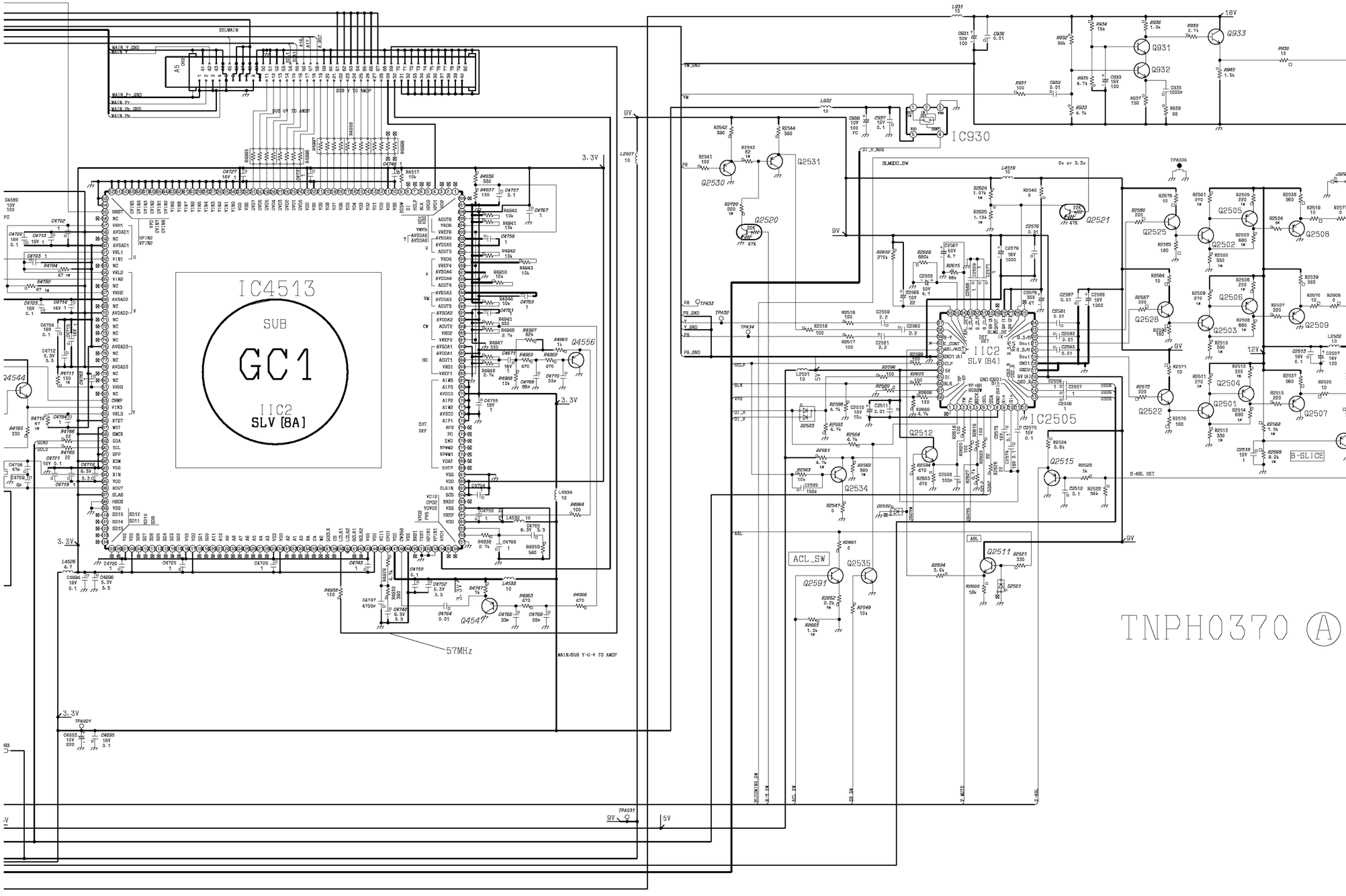


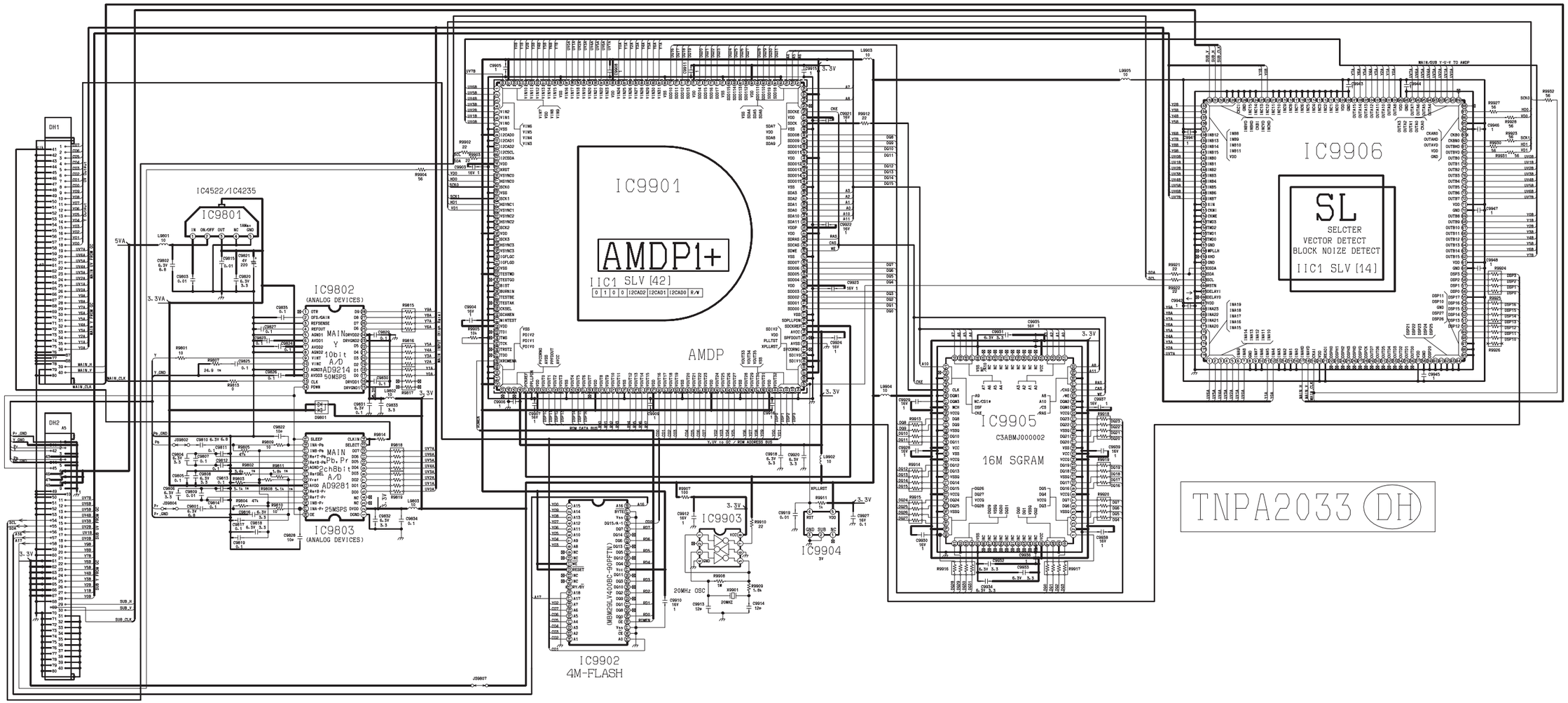
A-Board Schematic, Right Middle Portion



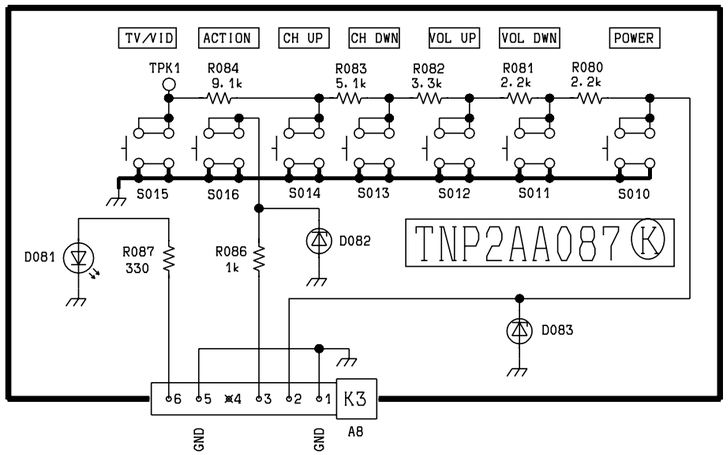
A- Board Schematic, Right Portion

ALL MODELS

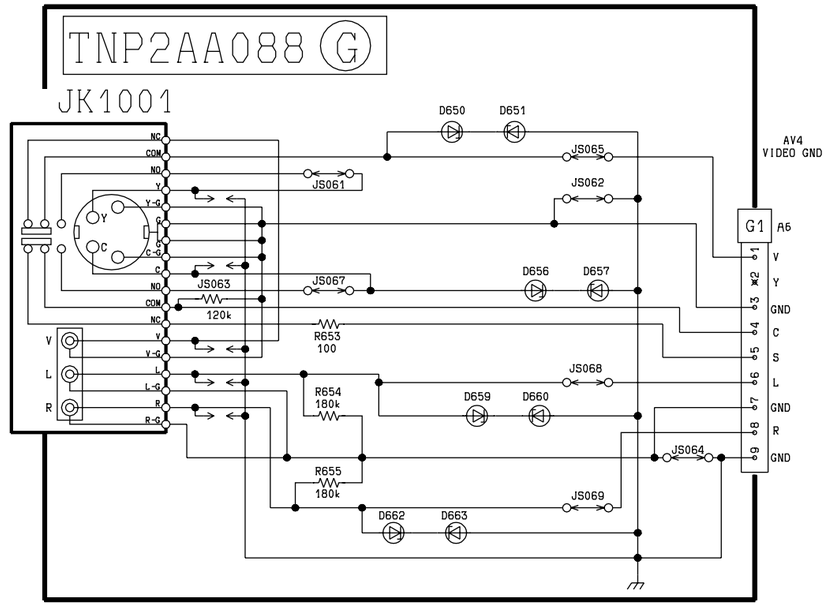



IC9901
AMDP1+
IIC1 SLV [42]
0 1 0 0 I2CAD2 I2CAD1 I2CAD0 R/W
AMDP
IC9906
SL
SELCTER
VECTOR DETECT
BLOCK NOIZE DETECT
IIC1 SLV [14]
IC9905
C3ABMJ000002
16M SGRAM
IC9902
4M-FLASH
IC9903
20MHz OSC
IC9904
IC9803
(ANALOG DEVICES)
AD9281
IC9802
(ANALOG DEVICES)
AD9214
IC9801
IC4522/IC4235
MAIN/SUB Y-U-V TO AMDP
TNPA2033 DH

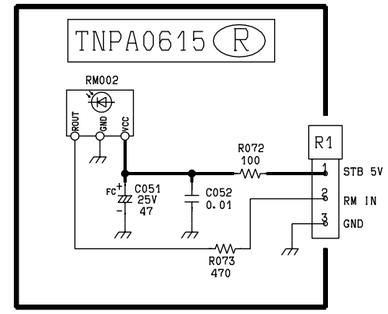
K-Board Schematic



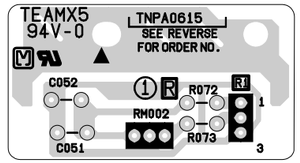
G-Board Schematic



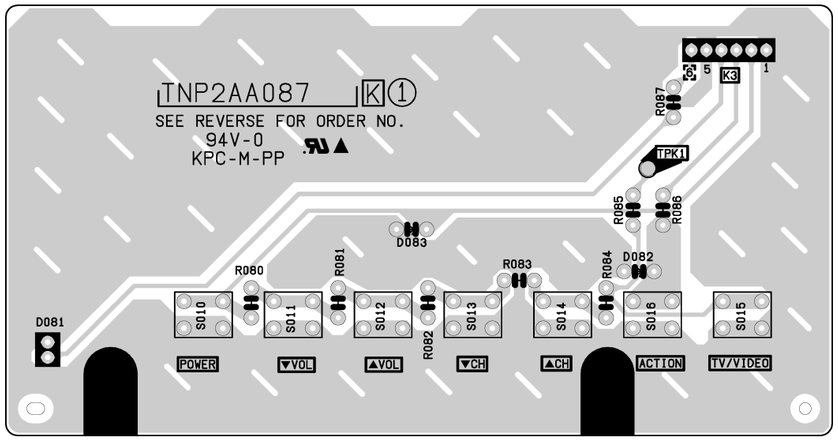
R-Board Schematiematic



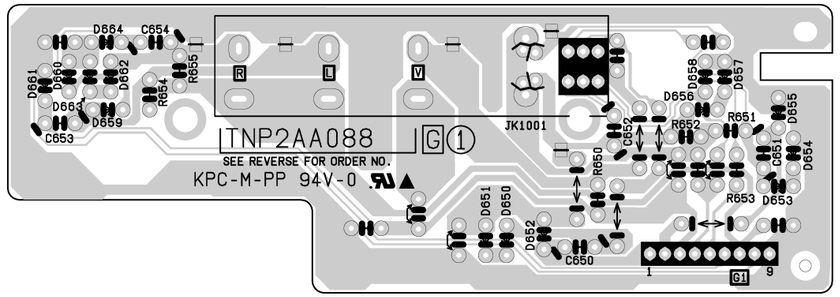
R-Board Layout



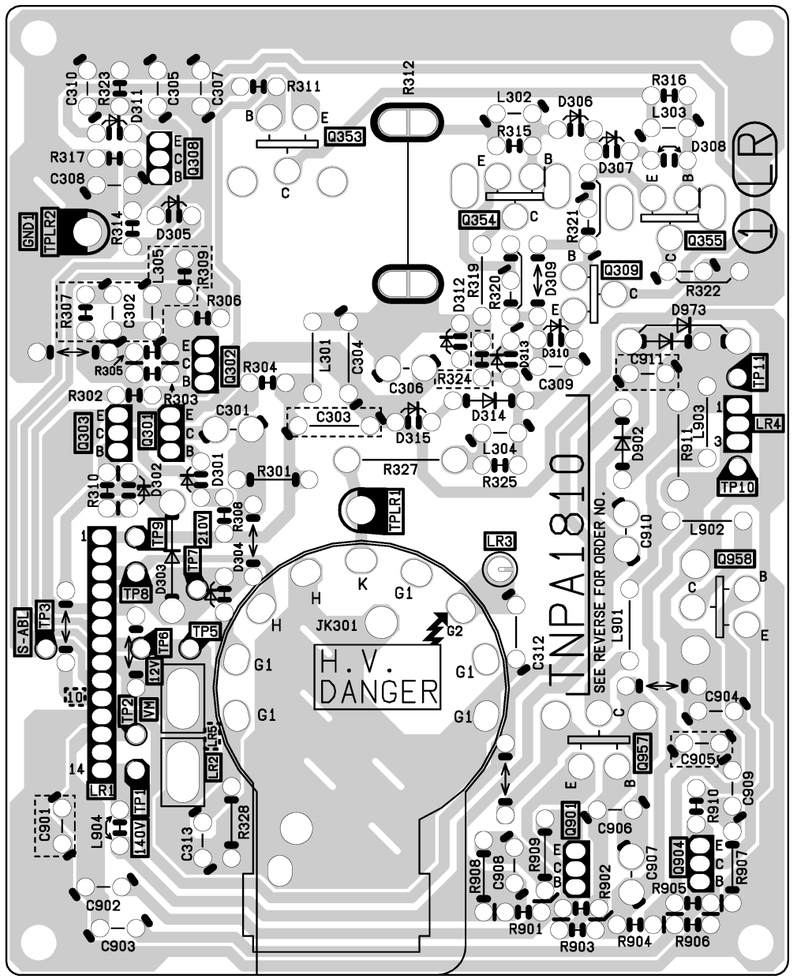
K-Board Layout

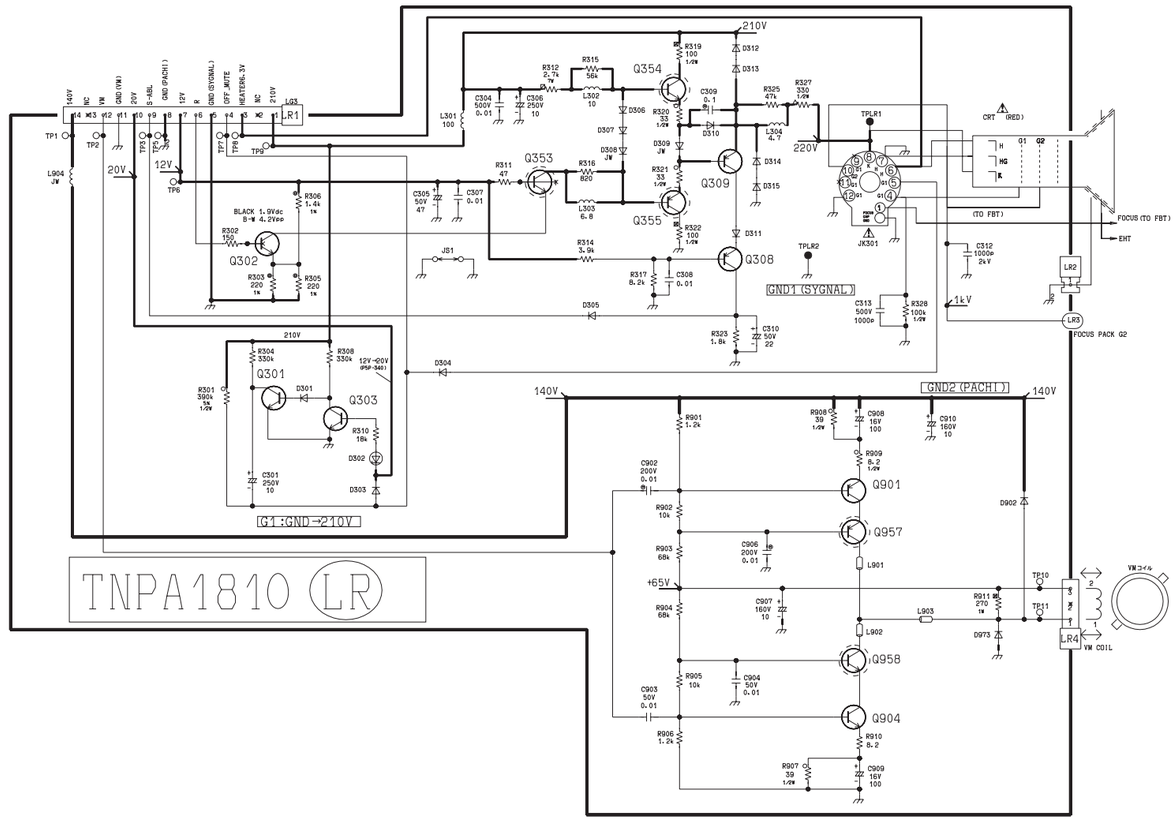


G-Board Layout



LR-Board Layout & Schematic

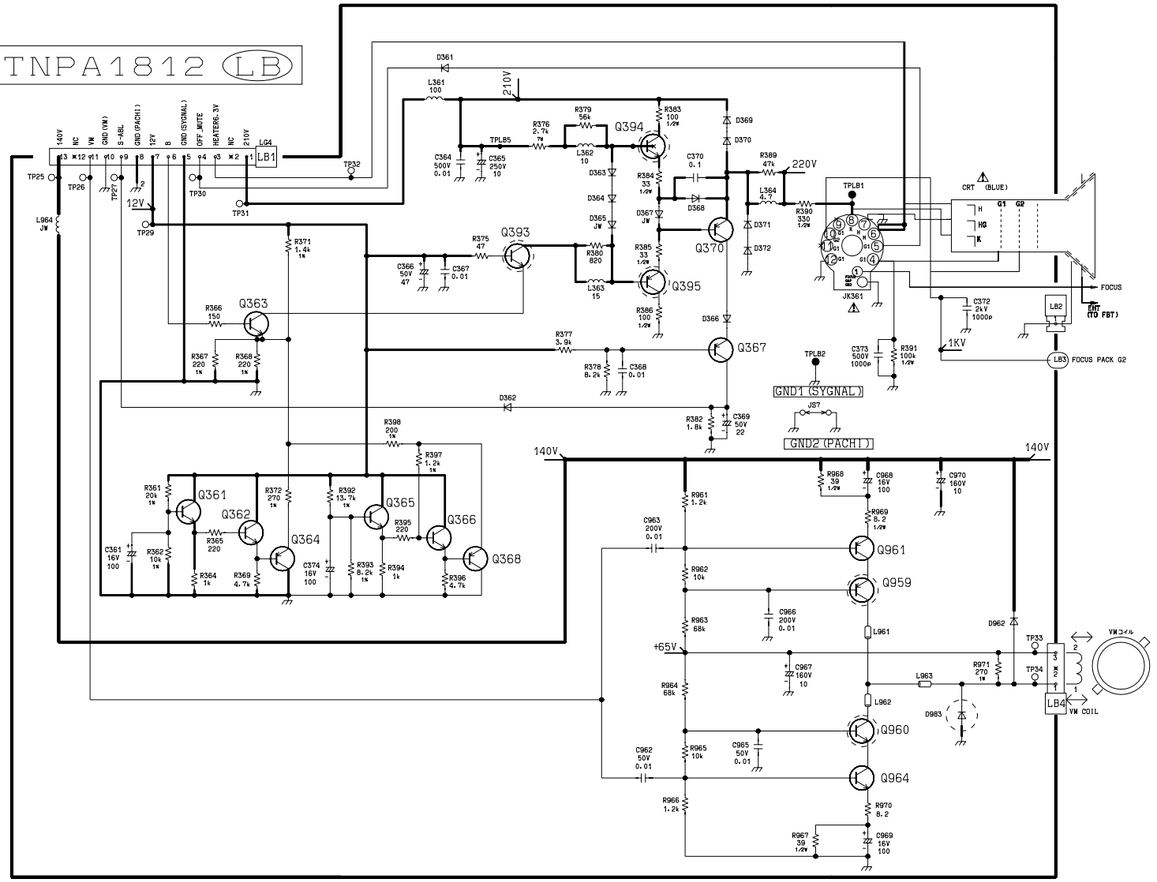


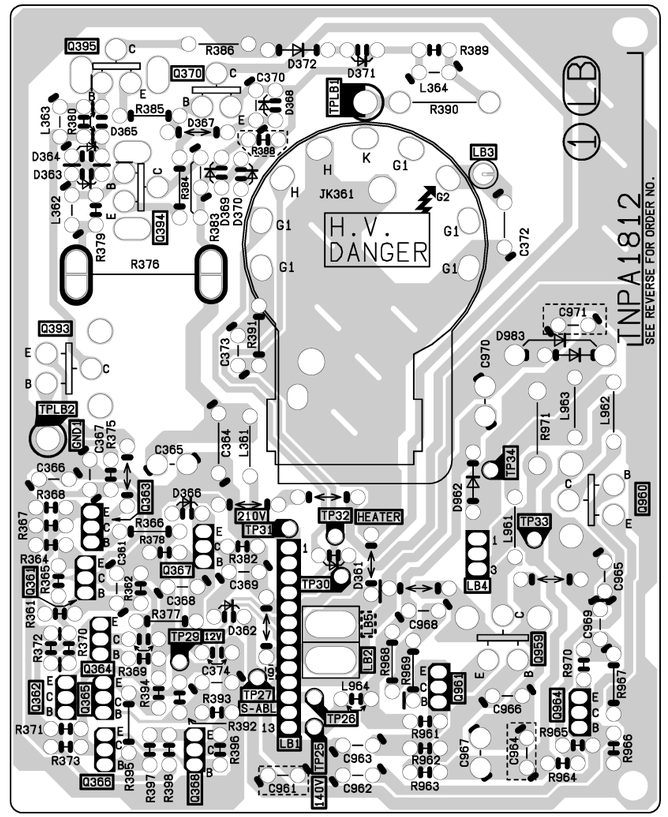


LR-Board Voltage Measurements (Transistors)

	Q355	Q309	Q354	Q353	Q308	Q302
B	175.30	176.40	177.00	11.50	8.10	2.90
C	0.30	8.10	216.80	175.70	1.70	11.50
E	176.20	176.40	176.80	11.90	8.00	2.50

	Q301	Q303	Q901	Q957	Q904	Q958
B	0.00	0.60	137.90	129.70	1.00	9.60
C	210.00	0.10	130.40	71.40	9.00	71.40
E	0.00	0.00	138.50	130.30	0.40	9.00



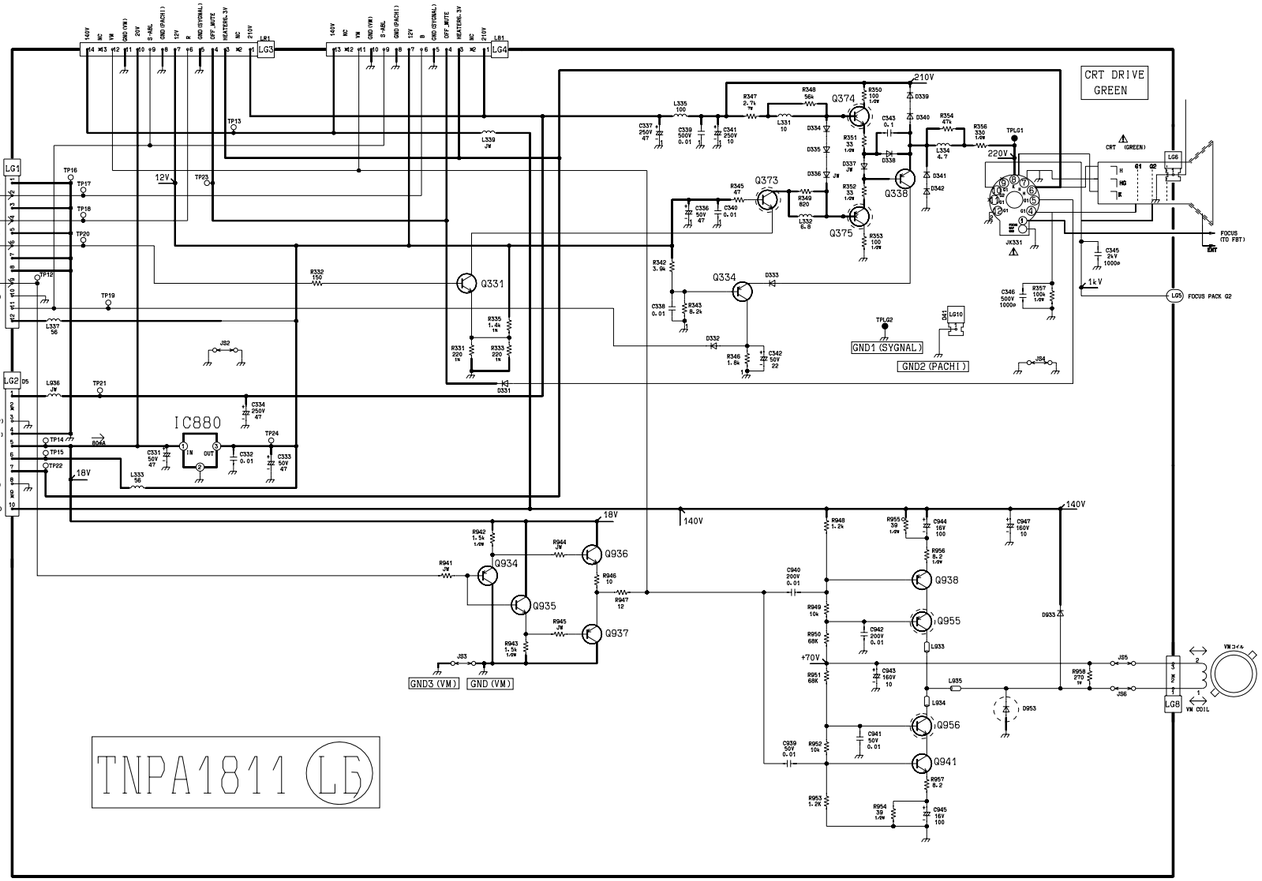


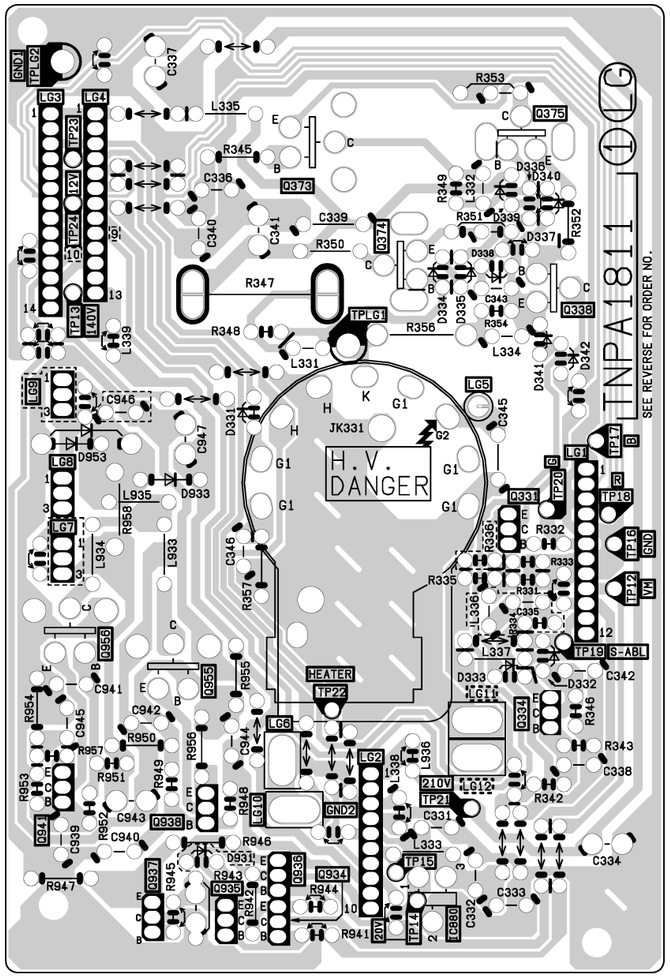
LB-Board Voltage Measurements (Transistors)

	Q395	Q370	Q394	Q393	Q367	Q361
B	173.00	174.10	174.40	11.90	8.10	7.90
C	0.30	8.20	216.90	173.10	2.50	0.00
E	174.00	174.00	174.20	11.50	8.10	8.20

	Q364	Q362	Q961	Q959	Q964	Q960
B	6.80	7.50	137.90	129.80	1.00	9.50
C	0.00	11.90	130.40	71.70	8.90	71.70
E	3.60	6.80	138.50	130.40	0.40	9.00

LG-Board Schematic, Layout & Voltages





LG-Board Voltage Measurements (IC & Transistors)

	Q331	Q334	Q338	Q375	Q374	Q373
B	2.89	8.14	175.90	175.20	176.50	11.90
C	11.51	1.43	8.20	0.30	216.80	175.20
E	2.47	8.00	175.90	175.80	176.00	11.50

	Q956	Q941	Q955	Q935	Q936	Q939
B	9.50	1.00	129.80	10.20	10.80	10.20
C	71.70	9.00	71.70	19.50	19.50	0.00
E	9.00	0.40	130.40	9.60	10.20	10.80

	Q937	Q938
B	9.60	137.90
C	0.00	130.90
E	10.20	138.50

IC880	
1	19.98
2	0.00
3	11.94

A-Board Voltage Measurements (IC's)

IC7001	
1	0.00
2	0.00
3	-18.01
4	-19.11
5	19.4
6	-0.12
7	-0.12
8	-19.11
9	-0.16
10	19.40
11	-0.77
12	-19.11
13	-0.56
14	-0.57
15	-0.12
16	-0.12
17	-19.11
18	-0.16

IC7002	
1	0.00
2	0.00
3	-17.97
4	-19.12
5	19.41
6	-0.48
7	-0.48
8	-19.11
9	-0.62
10	19.40
11	-0.20
12	-19.11
13	-0.16
14	-0.16
15	-0.44
16	-0.39
17	-19.11
18	-0.49

IC2302			
1	-22.21	14	-20.95
2	-22.23	15	0.00
3	-0.32	16	-5.36
4	21.46	17	0.00
5	9.43	18	0.00
6	4.91	19	0.00
7	0.00	20	0.00
8	2.55	21	9.35
9	0.00	22	21.47
10	0.00	23	-0.31
11	0.00	24	-22.25
12	5.23	25	-11.94
13	0.00		

D-Board Voltage Measurements (IC & Transistors)

IC602	
1	4.07
2	0.62
3	12.07
4	4.84
5	0.00
6	4.11
7	0.00
8	0.61
9	2.80
10	3.10
11	0.00
12	0.00
13	4.89
14	3.87
15	6.04
16	3.19

IC803	
1	15.90
2	0.00
3	12.07

IC872	
1	19.02
2	9.07
3	0.00
4	8.98
5	2.23

IC701	
1	5.91
2	0.60
3	1.12
4	0.00
5	5.96
6	3.11
7	7.04
8	8.91

IC451	
1	0.00
2	17.31
3	-15.97
4	-17.28
5	0.00
6	17.09
7	0.00

IC805	
1	12.40
2	0.00
3	9.08

IC871	
1	19.03
2	5.08
3	0.00
4	5.00
5	2.25

IC603	
1	3.11
2	4.47
3	4.47
4	0.00
5	3.23
6	3.24
7	2.97
8	8.91

IC1501	
1	0.00
2	5.80
3	4.68
4	0.00
5	5.70
6	5.70
7	4.06
8	8.91

IC802	
1	139.40
2	18.50
3	0.00

IC801	
1	1.22
2	0.46
3	0.16
4	0.00
5	0.00
6	7.82
7	20.60
8	0.00
9	5.91

IC2302			
1	-22.21	14	-20.95
2	-22.23	15	0.00
3	-0.32	16	-5.36
4	21.46	17	0.00
5	9.43	18	0.00
6	4.91	19	0.00
7	0.00	20	0.00
8	2.55	21	9.35
9	0.00	22	21.47
10	0.00	23	-0.31
11	0.00	24	-22.25
12	5.23	25	-11.94
13	0.00		

IC601			
1	0.20	13	0.00
2	0.00	14	0.00
3	0.00	15	3.09
4	0.00	16	2.81
5	0.00	17	3.03
6	6.51	18	5.93
7	5.22	19	2.14
8	9.08	20	0.00
9	2.51	21	2.14
10	0.61	22	4.92
11	0.87	23	0.00
12	1.00	24	0.29

IC811	
1	19.60
2	18.60
3	0.00
4	5.86

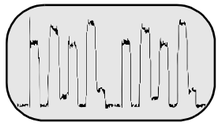
	Q406	Q501	Q503	Q509	Q510	Q551	Q601
B	0.60	3.00	0.30	27.80	30.10	-0.20	0.60
C	0.10	15.40	8.50	138.90	138.90	-54.80	2.80
E	0.00	0.00	0.00	30.10	29.70	0.00	0.00

	Q602	Q603	Q604	Q605	Q606	Q801	Q802
B	4.10	0.60	4.80	3.20	0.00	0.00	0.72
C	8.90	4.90	8.90	0.00	9.80	46.10	0.13
E	3.50	0.00	4.30	3.80	0.00	7.50	0.00

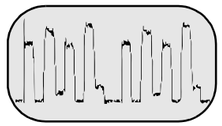
	Q803	Q854	Q1503	Q1504	Q1505	Q7010
B	20.60	139.00	9.80	12.00	4.70	0.00
C	0.00	0.00	4.80	588.00	10.70	21.10
E	20.60	139.30	10.40	11.00	4.00	7.10

	Q502
D	0.00
S	0.00
G	8.50

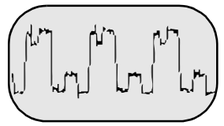
A-Board



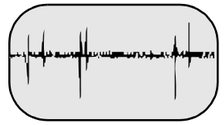
1 **6.72V p-p**
A15 PIN 2 (BLUE OUT)



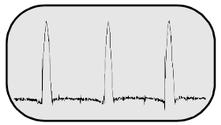
2 **6.56V p-p**
A15 PIN 4 (RED OUT)



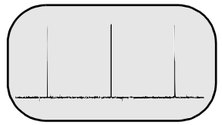
3 **5.36V p-p**
A15 PIN 6 (GREEN OUT)



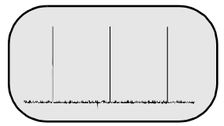
4 **4.00V p-p**
A15 PIN 9 (VM OUT)



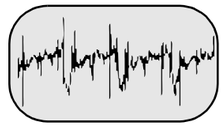
5 **0.98V p-p**
A15 PIN 11 (S-ABL)



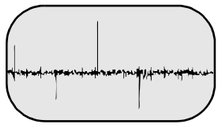
6 **3.16V p-p**
A4 PIN 16 (DFCUT)



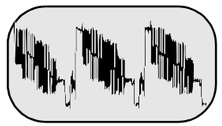
7 **3.08V p-p**
A3 PIN 15



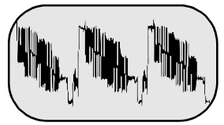
8 **0.11V p-p**
A2 PIN 13 (ABL)



9 **0.18V p-p**
A2 PIN 15 (SOS)

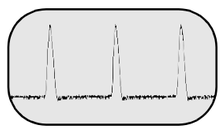


10 **1.00V p-p**
TNR001 (VIDEO)



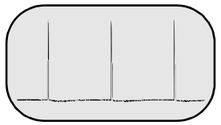
11 **1.00V p-p**
TNR002 (VIDEO)

LG-Board

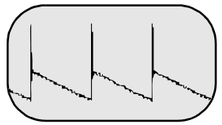


12 **26.4V p-p**
LG2 PIN 7 (HEATER)

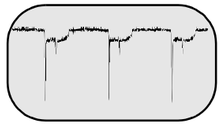
D-Board



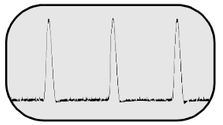
13 **36.0V p-p**
IC451 PIN 3



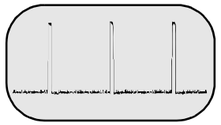
14 **68.8V p-p**
IC451 PIN 5 (V-OUT)



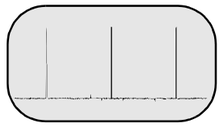
15 **14.0V p-p**
Q551-B



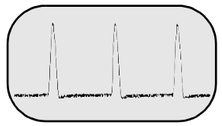
16 **1.50KV p-p**
Q551-C



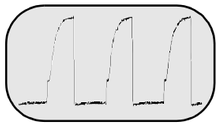
17 **3.12V p-p**
IC601 PIN 1 (H-PULSE)



18 **3.20V p-p**
IC601 PIN 2 (VP3)

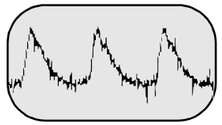


19 **6.48V p-p**
IC601 PIN 10 (FBP IN)

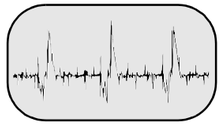


20 **8.40V p-p**
IC601 PIN 15 (H-DRIVE OUT)

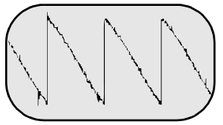
21 **4.96V p-p**
IC601 PIN 22 (V-PULSE OUT)



22 **0.53V p-p**
IC602 PIN 1 (EHT FB ADJ)

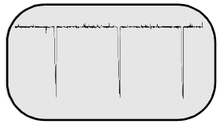


23 **1.90V p-p**
IC602 PIN 4 (EW FB)

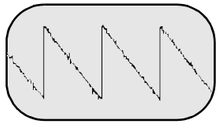


24 **1.90V p-p**
IC602 PIN 6 (V FB)

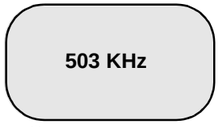
25 **4.80V p-p**
IC602 PIN 13 (V IN)



26 **2.84V p-p**
IC602 PIN 14 (TC)



27 **2.04V p-p**
IC602 PIN 15 (RAMP)



28
IC602 PIN 7 (X-TAL)

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